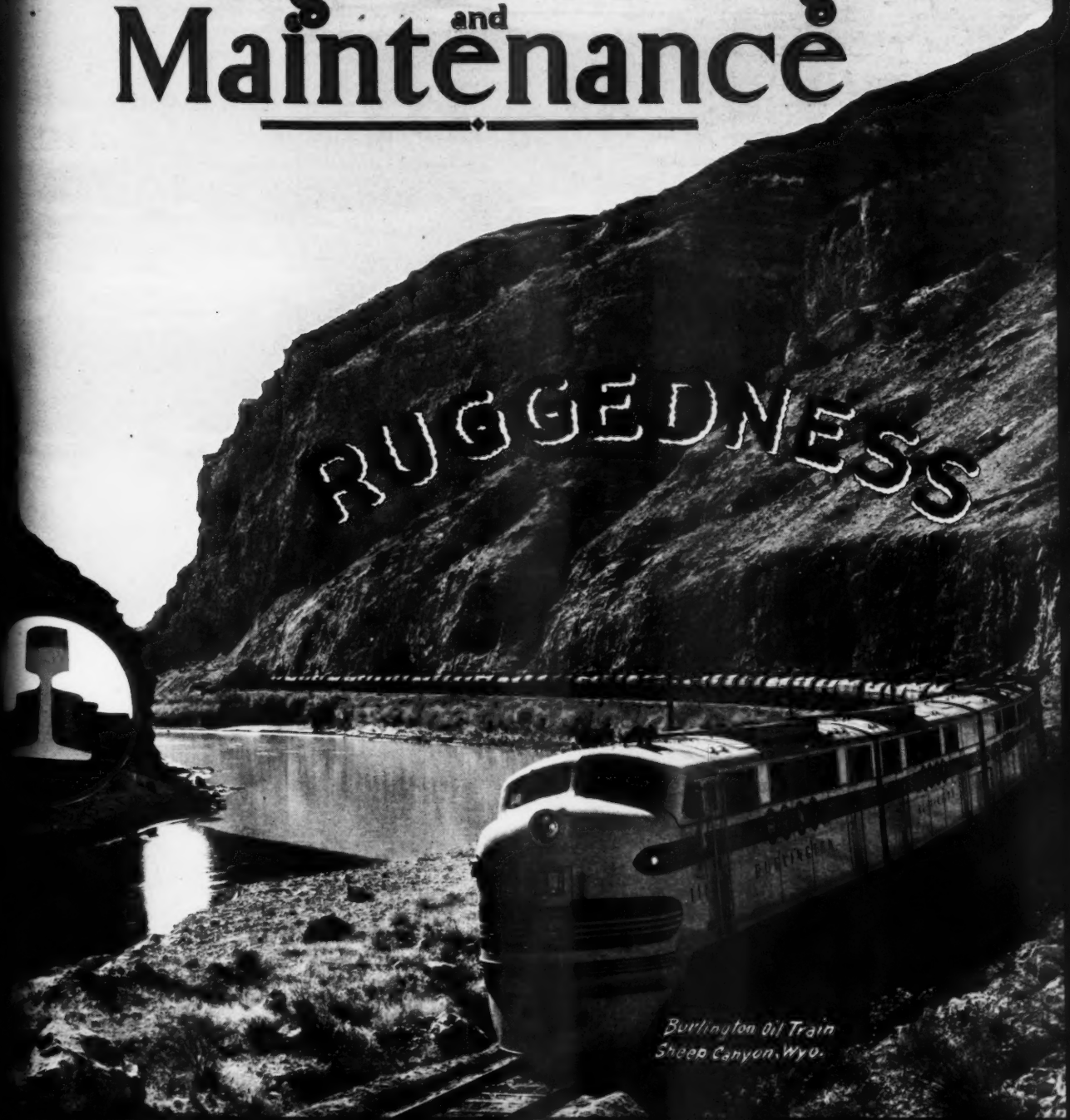
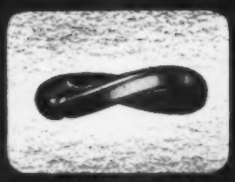
EQUIPMENT ECONOMIES NUMBER MARCH, 1947

Railway Engineering and Maintenance

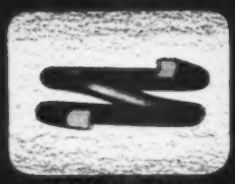


Burlington Oil Train
Sheep Canyon, Wyo.

RELIANCE HY-Crome



HY-CROME SPRINGLOX

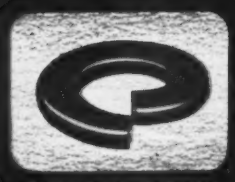


THACKERAY HY-CROME

Exhibit in print...

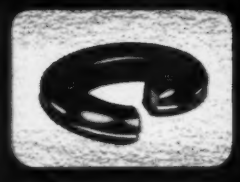
Pin-Up Pictures of Reliance Hy-Crome Spring Washers do not display shapeliness in the usual pin-up manner but their form and size is all important in the job they do. The various types of Reliance Hy-Crome Spring Washers are designed to specifications established through careful experimentation efforts in the field and laboratory to determine the best shape of section for each specific application and to meet the service condition.

Select from our Pin-Up Pictures of Reliance Hy-Crome Spring Washers the one best suited to your purpose to keep track and motive power bolts tight through Hy-Crome's unfailing compensating factor, which combats the effect of looseness resulting from inevitable wear. Contact Reliance Service Engineers for information on your fastening problem and samples for test.



HY-REACTION HY-CROME

STANDARD HY-CROME



HY-PRESSURE HY-CROME

HY-CROME PRESSURE SPRING

EATON

EATON MANUFACTURING COMPANY

Greetings to the members of the American Railway Engineering Association and the many railroad friends we hope to have the pleasure of seeing at the convention and exhibit of the National Railway Appliance Association. Stop in and see us at the Eaton-Reliance Booths 82 and 83.

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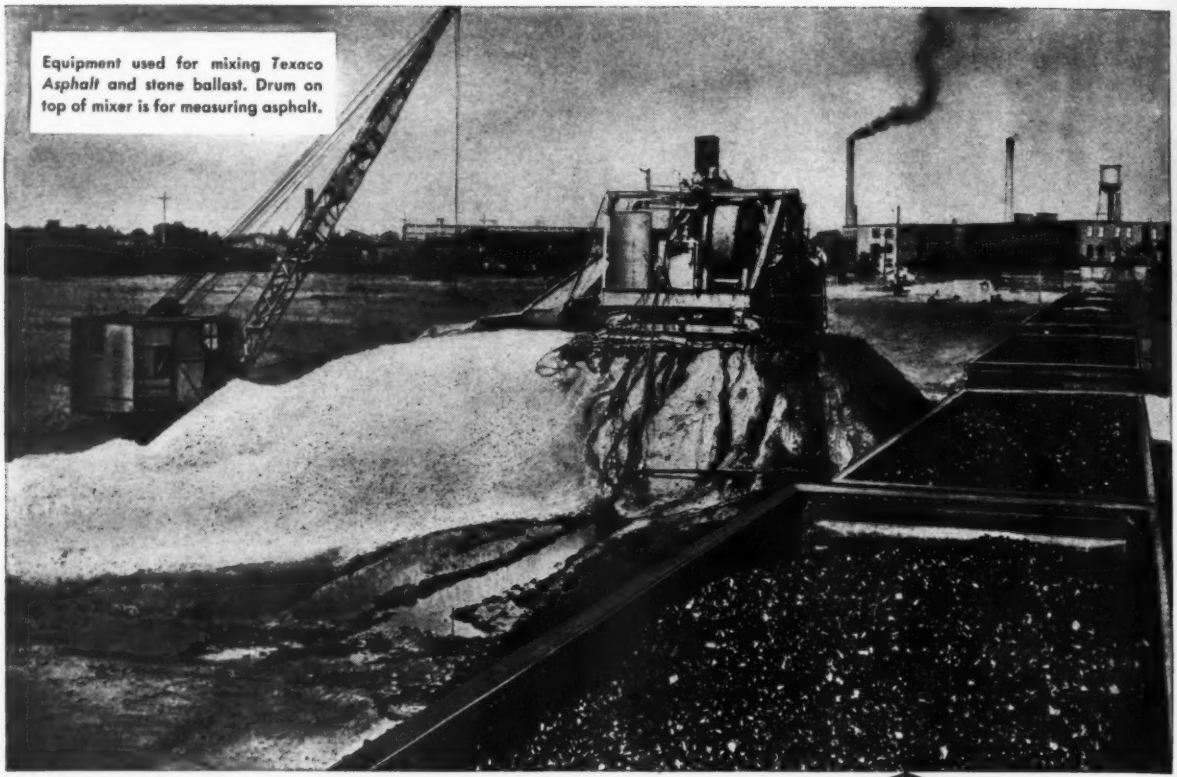

Equipment used for mixing *Texaco Asphalt* and stone ballast. Drum on top of mixer is for measuring asphalt.

REDUCE ROADBED MAINTENANCE COSTS WITH..... ASPHALT-COATED STONE BALLAST

TEXACO ASPHALT mixed with stone ballast forms a waterproof sealcoat that assures complete, quick drainage, prevents fouling of ballast with dirt and cinders, keeps track in good line and surface longer — at lower cost!

Texaco Asphalt is an ideal ballast coating because it stays flexible, will not crack under heavy traffic, can be tamped even after long service. Inexpensive and easy to apply, it is especially effective for ballasting track adjoining station platforms, at approaches to open floor bridges, under overhead structures, and similar places where drainage is ordinarily a problem.

For 40 years, *Texaco Asphalt* has been used in steadily increasing volume for the construction and maintenance of America's streets and highways. A similar steady increase in its use by American railroads is further evidence that *you can't buy a better asphalt!*

For details on how *Texaco Asphalt* can help you reduce track maintenance, call the nearest Railway Sales Division office listed below, or write The Texas Company, *Railway Sales Division*, 135 East 42nd Street, New York 17, N. Y.

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TEXACO

TEXACO Asphalt for Coating Ballast

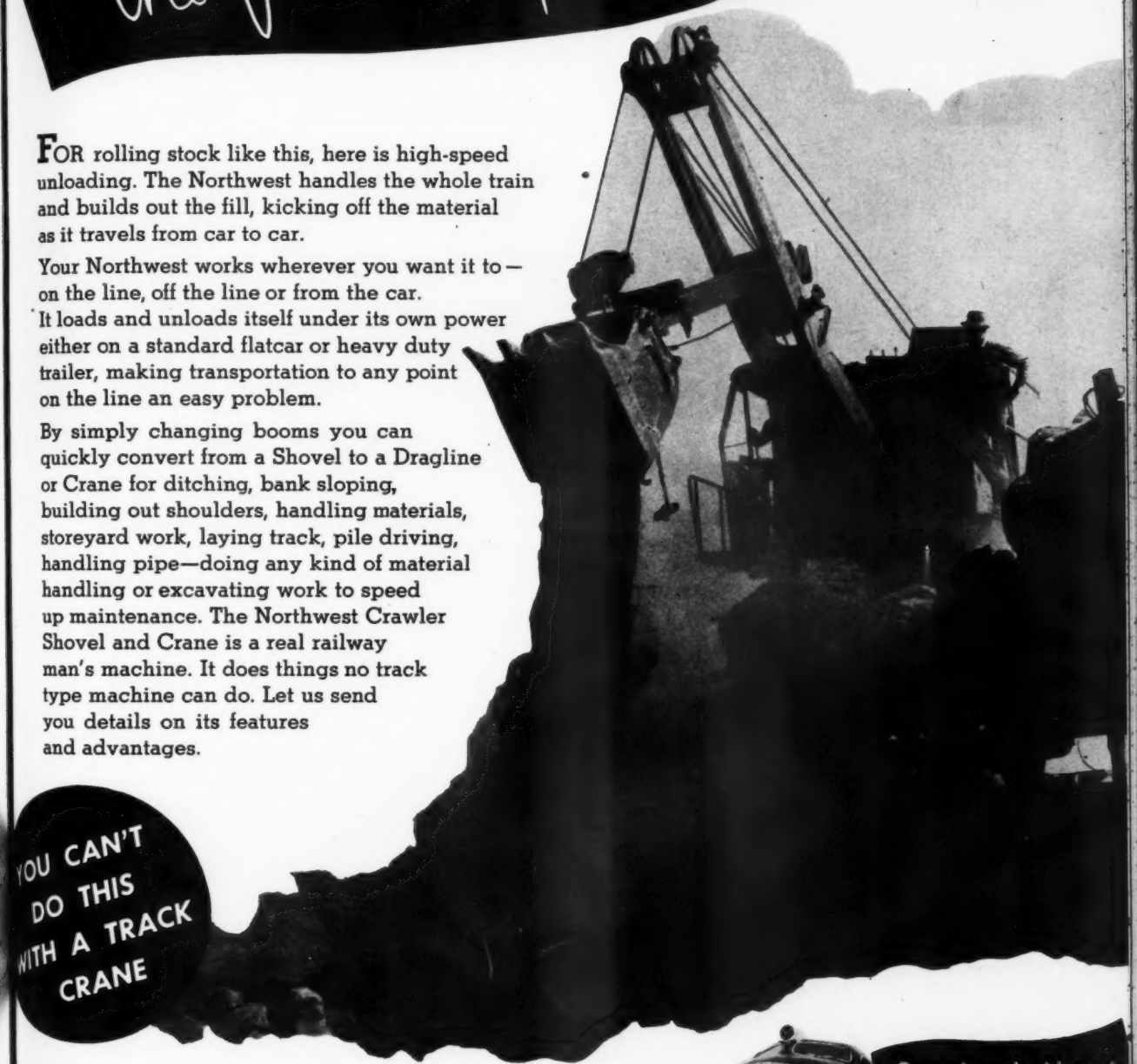
Tune in . . . TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

Unloading it the fast easy way

FOR rolling stock like this, here is high-speed unloading. The Northwest handles the whole train and builds out the fill, kicking off the material as it travels from car to car.

Your Northwest works wherever you want it to—on the line, off the line or from the car. It loads and unloads itself under its own power either on a standard flatcar or heavy duty trailer, making transportation to any point on the line an easy problem.

By simply changing booms you can quickly convert from a Shovel to a Dragline or Crane for ditching, bank sloping, building out shoulders, handling materials, storeyard work, laying track, pile driving, handling pipe—doing any kind of material handling or excavating work to speed up maintenance. The Northwest Crawler Shovel and Crane is a real railway man's machine. It does things no track type machine can do. Let us send you details on its features and advantages.



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THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

2290 TROOP SLEEPERS

KITCHEN CARS

OFFERED AT A FRACTION OF ORIGINAL COST

Here is the economical answer to immediate railroad shipping requirements, emergency housing, kitchen unit equipment. These government surplus troop sleepers and kitchen cars can be altered at reasonable cost to serve as camp cars or used in "head-in" service.

This low fixed price sale is on an "as-is-and-where-is" basis. All cars are used with some items of loose equipment missing on many. But, they represent unusual values "as is" where space or rolling stock is required.

Most of these cars can be inspected at Illiopolis, Illinois and arrangements may be made through the Chicago regional office of WAA. Five kitchen cars are stored at Arlington Yards, Staten Island, N. Y. Call N. Y. regional office for inspection. Cars priced F. O. B. track location. Credit can be established. Send your orders to: Steam Equipment Section, Room 4524, Railroad Retirement Building, Washington, D. C.

WHAT IS AVAILABLE

396 Special Troop Kitchen Cars.....$3,240. each including refrigeration, meat and work tables, lockers, sink, coal bin, shower bath, etc. Adequate heating, lighting and water supply systems. Built by American Car and Foundry Co.

1177 Special Troop Sleeping Cars.....$2,880. each sleep 30 people, 10 Simmons 3 tier complete bed units, 2 toilets, 4 wash stands. Built by Pullman Standard Car Manufacturing Co.

717 Special Troop Sleeping Cars.....$3,780. each Same features as above but containing minor improvements, and built later.

CONDITIONS OF SALE

This is a concurrent and continuous sale. Purchasers claiming priority should clearly establish their priority at the time the offer is made. Offers from priority claimants must be received by noon March 21, 1947. Offers received from priority claimants after that date will be filled on the same basis as those from non-priority claimants. Awards to priority claimants will be made in the following sequence: (1) Federal agencies, (2) Certified Veterans of World War II, (3) Subsequent priority claimants, (4) Non-priority purchasers. Offers received after that date will be filled on equal basis.

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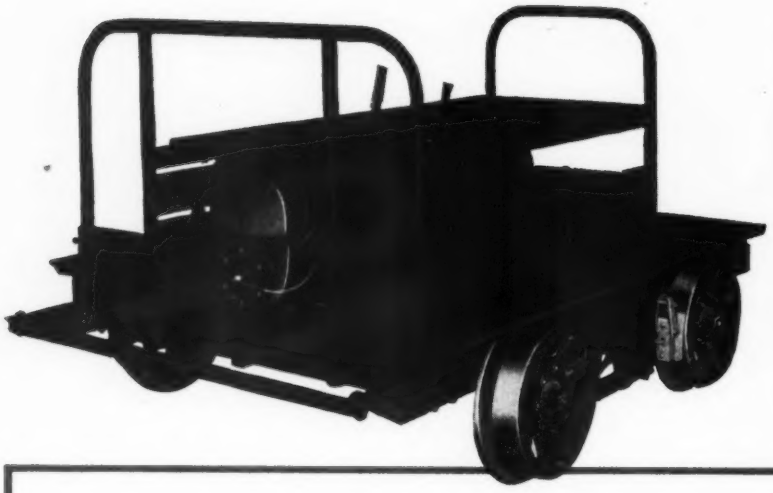


Pound for Pound, Inch for Inch...

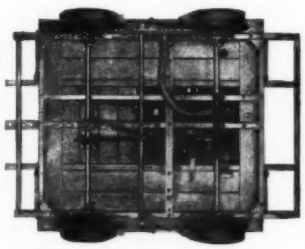
It's Built for Service!

So *sturdy* that it carries an 8-man gang with tools in complete safety—so *light* that one man can easily handle it—this is the Fairbanks-Morse No. 53 Motor Car.

It weighs only 930 lbs.; its rear end lifting weight is but 130 lbs. Chain driven, it is powered by a dependable 8- to 13-hp. motor.

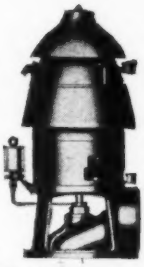
It offers proved reliability, serviceability, and operating economy—as do all motor cars in the complete Fairbanks-Morse line. Write for full particulars about the motor cars that are, and always will be, built for service.

Fairbanks, Morse & Co., Chicago 5, Ill.

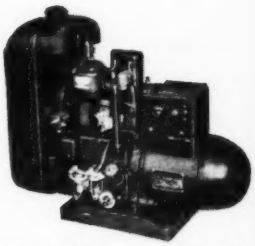


Under side of No. 53 Motor Car, showing transmission assembly.

Fairbanks-Morse Demountable-Hub Steel Wheels—for all motor car requirements.



Fairbanks-Morse Pumps—a full line of complete pumping units for every need.



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Diesel Locomotives • Magnetos
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NORDBERG Developed these TOOLS
For your maintenance jobs

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Practically all new rail laid by class 1 roads is placed on tie seats prepared by Nordberg Adzing Machines. Machined adzing is a "must" in modern maintenance methods.

SPIKE PULLER

In addition to pulling spikes faster thereby speeding up the entire rail laying job, the Nordberg Spike Puller reduces the cost of spike removal and eliminates accidents.

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Driving every spike straight, to the correct depth and at the rate of 800 spikes an hour is regular performance for the Nordberg Spike Hammer.

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With its accurate overload release, the Nordberg Power Wrench assures every track bolt will be tightened to uniform tightness.

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The Cribex is a recent Nordberg development tor excavating foul ballast from tie cribs. Two machines working in tandem will easily clean 100 tie cribs an hour.

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Speed and accuracy of lift of the hydraulically operated Power Jack gives better line and surface than can be obtained with hand jacks and at a great saving in time and labor.

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This simple, powerful Rail Drill can be set up and operated by ordinary track gang labor. A one man machine, easily moved from job to job.

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Two models of Surface Grinders are available for surfacing welded rail ends, a heavy duty machine for big production and a light weight machine for use in congested traffic areas.

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While principally used for rail end slotting, the Utility Grinder when equipped with the various Nordberg accessories can also be used for other grinding work.

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For surfacing joints, removing mill tolerance, equalizing height of cropped rail, grinding out wheel burns and corrugations. The Midget Grinder is without equal for precision.

FLEXIBLE ARM GRINDER

This unique Flexible Arm Grinder is without equal for speed and versatility. It can be used for rail end slotting, removing flow from switches and stock rails, etc.

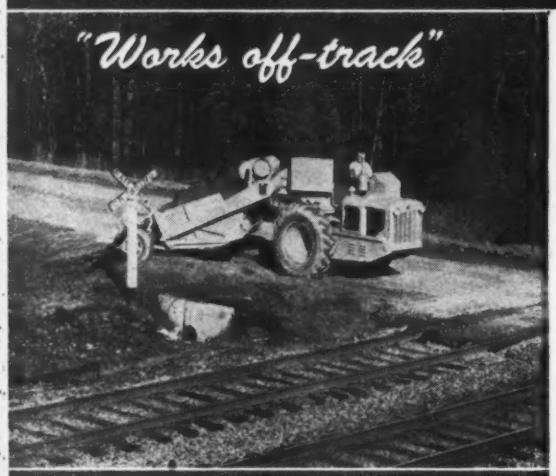
The complete line of Nordberg power driven maintenance tools will be displayed at the National Railway Maintenance Show at the Coliseum, Chicago, March 17 to 20 inclusive. See these modern tools which will aid in improving the quality of your track work, do it at less expense and in less time even in face of today's shortage of track labor.

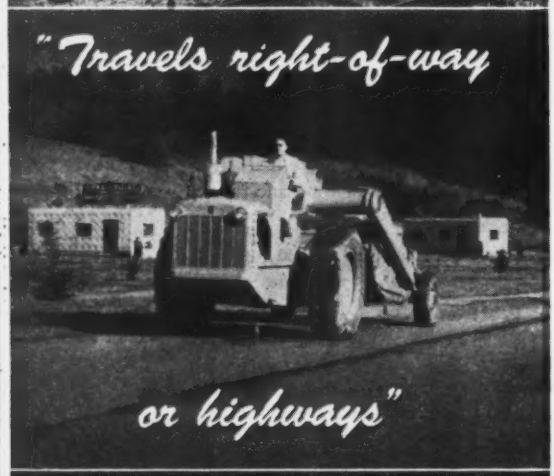
NORDBERG MFG. CO. • MILWAUKEE 7, WIS.

NORDBERG POWER TOOLS

for better maintained track at less expense

NEW small TOURNAPULL





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EQUIPMENT

For complete information on this one-man maintenance gang see your Le Tourneau Distributor NOW.

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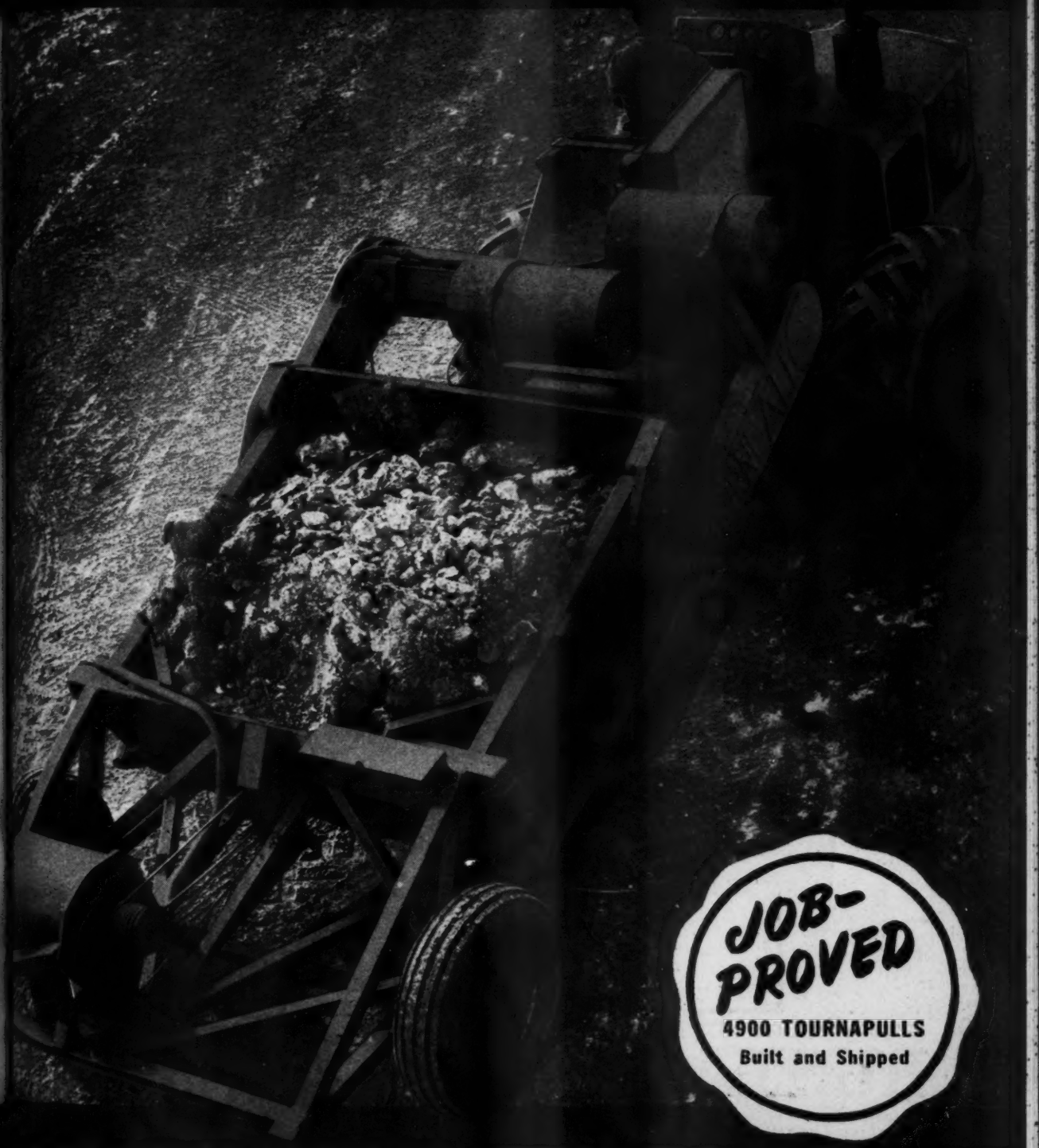

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29 railroads*

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THE UNDER-WATER SURFACES OF

STEEL WATER STORAGE TANKS

WITH

RUSTA RESTOR

THE CATHODIC (ELECTRICAL) RUST PREVENTIVE BECAUSE IT:

- rust-proofs permanently
- reduces tank maintenance costs
- permits tanks to remain in service continuously
- releases maintenance labor for other work

Rusta Restor neutralizes the electro-chemical action that causes rusting, removing old rust formations and preventing the accumulation of new ones.

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D. & T. S.		T. & P.	(10)
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K. C. S.		W. & L. E.	(2)
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L. I.			
M. C.	(5)		
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SALES OFFICES: CHICAGO—CLEVELAND—PHILADELPHIA—SAN FRANCISCO

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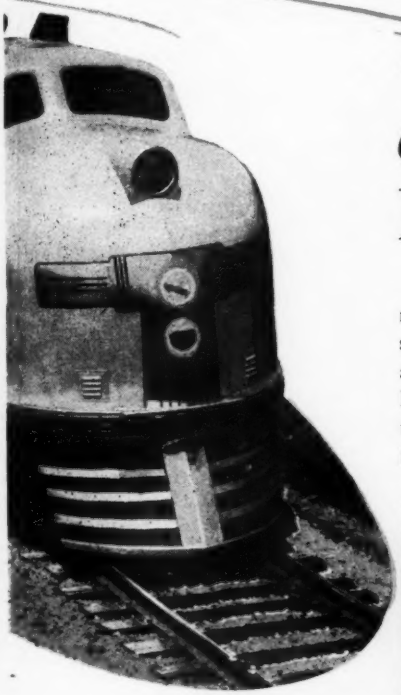
Your rail joint maintenance problem is simple when you use RMC Rail Joint Packing, for it is as permanent as the joint itself. RMC Packing has been used successfully on most of the major roads to reduce joint freezing caused by corrosion.

RAILWAY MAINTENANCE CORP.

PITTSBURGH 30, PENNSYLVANIA

SERVICE...

and Lowering Maintenance Cost



With competitive conditions now infinitely greater than ever before, speed must be increased. This means that where possible, wheel impact and excess strain should be eliminated. Conley *manganese toughened* Expansion Rails and Spring Frogs give the long desired *continuous* and *heavier* tread surface. Furthermore, this thoroughly modern track equipment cuts maintenance cost to the very minimum. This feature is proven by many installations extending over periods from ten to fifteen years.

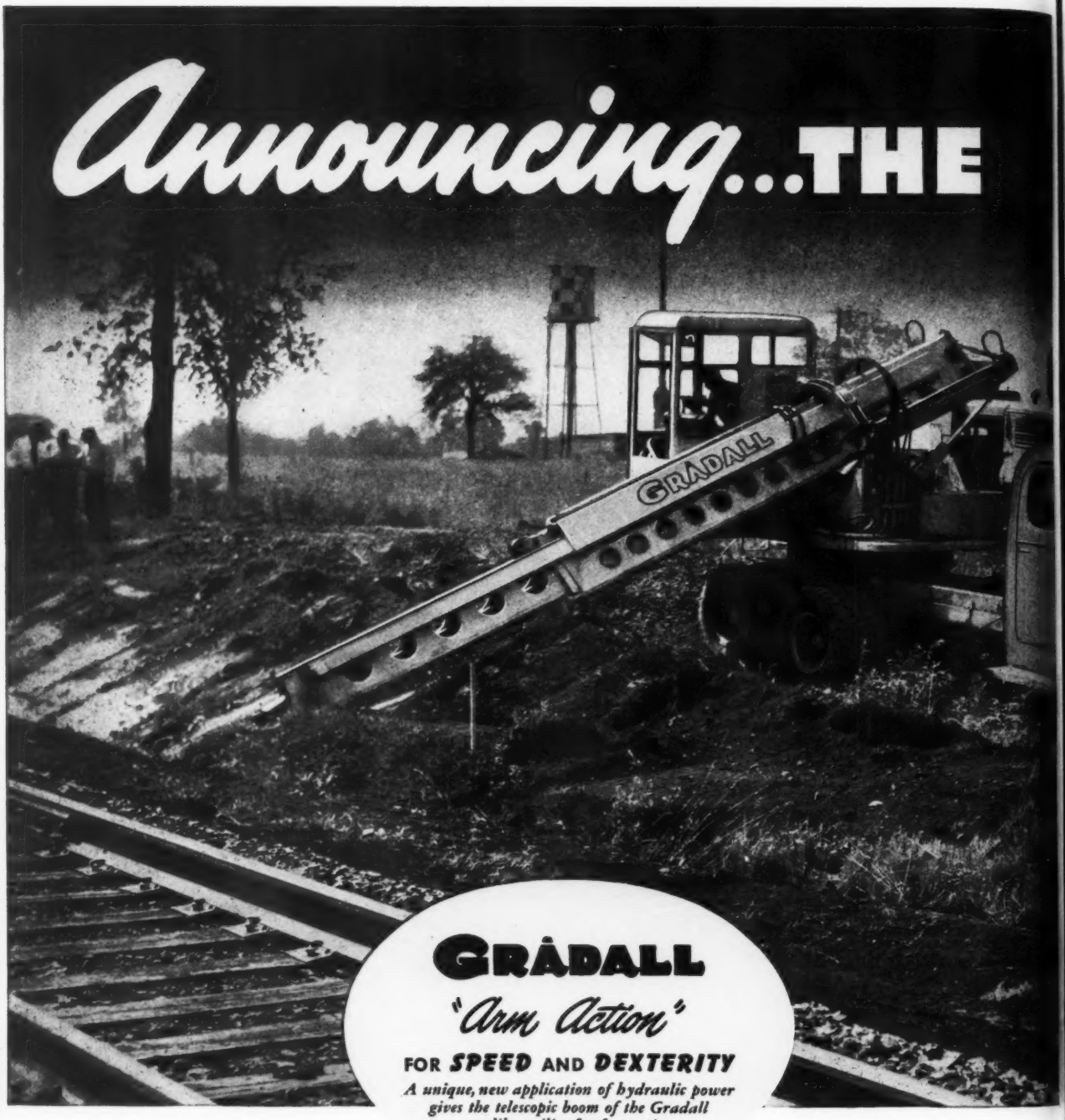
Conley *manganese toughened* Spring Frogs are self guarded, entirely eliminating the old guard rails and yet so engineered that wheel alignment is practically 100 per cent true—entirely overcoming lateral motion and permitting higher speeds of heavy trains. These Frogs are obtainable in angles up to No. 20 for use at the end of double tracks and the end of intermediate passing and crossovers where remote control is in use. Write for complete details.

Conley *manganese toughened* Expansion Rails and Spring Frogs are designed by experienced railroad engineers who thoroughly understand the need for practical design and dependable quality. They are proven by years and years of actual use under the heavy and fast traffic. Complete specifications and illustrated literature will be sent promptly.

CONLEY

★ EXPANSION RAILS · SPRING FROGS

Announcing...THE

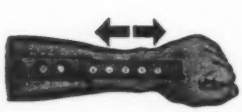


GRADALL

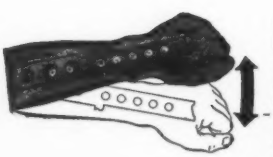
"Arm Action"

FOR *SPEED* AND *DEXTERITY*

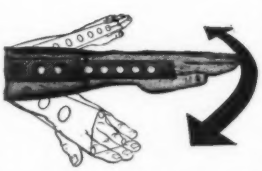
A unique, new application of hydraulic power gives the telescopic boom of the Gradall armlike agility for fast action.



IN AND OUT BOOM The Gradall's 12' boom extends hydraulically to 24' by means of an inner boom.

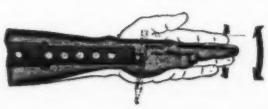


UP AND DOWN BOOM. The boom of the Gradall can be raised 22° to a dumping height of 14'10", or lowered 44° to a digging depth of 10'.



FULL 360° BOOM SWING A well-balanced platform with smooth revolving action permits a full 360° boom swing.

TOOL CONTROL. Tools can be held in any position through a vertical arc of 116°. Tools are quickly interchangeable.



TILTING BOOM. The Gradall boom can be tilted 45° each way from horizontal, permitting precision slope and contour grading.

For additional information, use postcard, pages 221-222

FLEXIBILITY *and* STRENGTH *of* RIC-WIL CONDUIT PERMITS SHALLOW INSTALLATION *of* STEAM LINES

Visit Our Booth 32 at A. R. E. A. Exhibit Coliseum Chicago

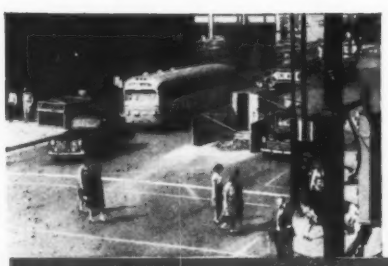
-even under Railroad Loadings

Underground steam line between RR sidings with expansion loop extending under tracks.

21 ft. Ric-wiL Prefabricated Insulated Pipe unit lowered into trench alongside tracks at RR passenger station without interrupting rail traffic.

The heavy-gauge helically corrugated shell used in Ric-wiL Prefabricated Insulated Pipe Units makes possible a resilient construction of high beam strength, which can safely be installed under E72 RR loadings with only 3 feet of ground cover, and under E90 loadings with only 5 feet. Because of this and other exclusive Ric-wiL features, the trend of engineering departments of railroads is to specify Ric-wiL for all underground steam lines. It is possible to jack Ric-wiL through existing right-of-ways and to install steam lines without disturbing sidewalks, pavement or tracks and without permanent deformation of roadbeds, thus saving both installation and maintenance expense.

Secret of the strength and flexibility of Ric-wiL units is in these corrugations. Seam-welded, helically corrugated, heavy gauge galvanized iron shell with full round smooth ends and special Ric-wiL coupler, provide pressure-tight construction.



(Left) Normal traffic was maintained on this busy downtown street while Ric-wiL units were installed under pavement. Units were jacked through from building basements and joined to utility's steam main at manhole in center of street. *(Right)* Close-up of manhole showing auger crew and tool for drilling under pavement.

Before you draw up specifications for your next underground steam line, get all the facts about Ric-wiL. Write for catalog.

RIC-WIL INSULATED PIPE CONDUIT SYSTEMS

THE RIC-WIL COMPANY · CLEVELAND, OHIO

AGENTS IN PRINCIPAL CITIES

BLUE BRUTE TRACK TEAMS RACE AHEAD

Whenever maintenance crews are under *real* pressure you'll find Blue Brute Teams setting the pace.

Speed and stamina stand out in every Blue Brute. Take the new, streamlined Hand-I-Air Compressor . . . it's so light two men handle it — yet it has the guts of a heavyweight — delivers 60 cubic feet of low-cost air per minute with the smooth, effortless power of a champion. Light, tight Feather* Valves efficiently control the flow of power from this two-wheeled tornado . . . you get a Blue Brute that "breathes" like a well-conditioned athlete. No other compressor so small stays on the job so long without "time out" to catch its breath!

The four WTT-7 Tie Tampers with leakproof throttles are lean, tough, fast . . . weigh only 42 pounds each . . . are perfectly matched to the compressor for efficiency that adds up to more finished surfacing per day.

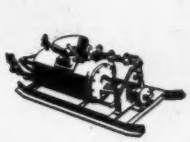
Other Blue Brutes . . . grouters . . . contractors' pumps . . . portable cement mixers . . . rock drills and pavement breakers . . . all team up to get more work done at less cost. Investigate them now . . . you'll find *there's more worth in Worthington-Ransome.*

H7-6

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Massachusetts

BUY BLUE BRUTES



Pneumatic Grouter

Portable Concrete Mixer

Self Priming Centrifugal Pump

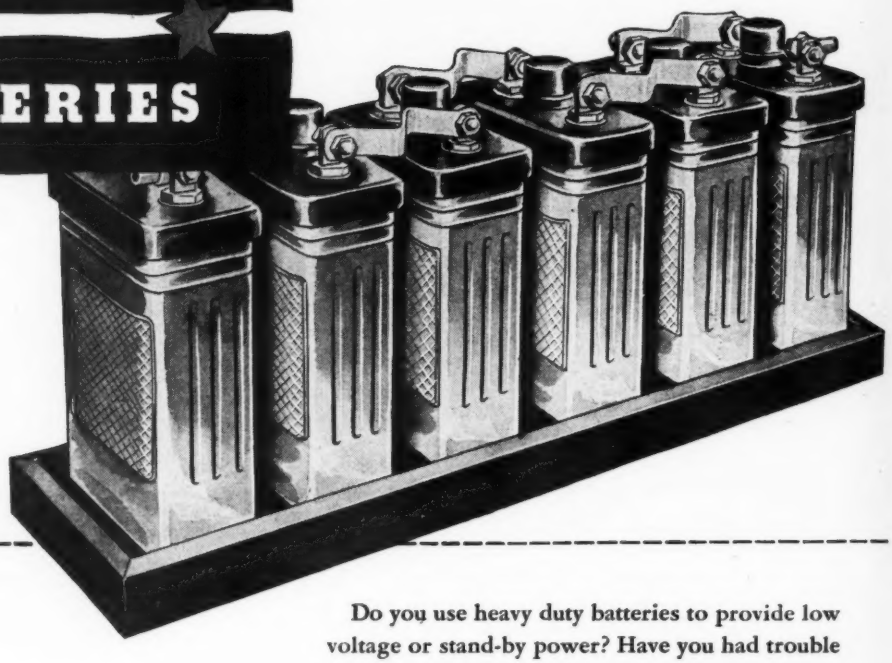
Hand Held Air Tools

Railcar Compressor

FOR EVERY CONSTRUCTION AND MAINTENANCE JOB

INDUSTRIAL STORAGE BATTERIES

MULTIPLE CELL HEAVY DUTY EQUIPMENT UNUSED SURPLUS IMMEDIATELY AVAILABLE



Do you use heavy duty batteries to provide low voltage or stand-by power? Have you had trouble obtaining standard replacement or new equipment made by well-known firms?

You can get the equipment you want immediately at the Philadelphia, Chicago, Denver, Cincinnati and Richmond offices of WAA. In most instances, priority claimants have already had an opportunity to purchase and you will not have to wait for delivery. The batteries are unused, many in original packing and complete with trays. Make sure you have an opportunity to purchase. Write, wire, phone, or visit the indicated offices at once.

This equipment may not be exported because of continued U. S. Lead shortages.

USED BATTERIES ALSO AVAILABLE

Heavy-duty used batteries will be offered for competitive bid sale. To receive bid offerings write the indicated offices and ask to be placed on the used Battery mailing lists.

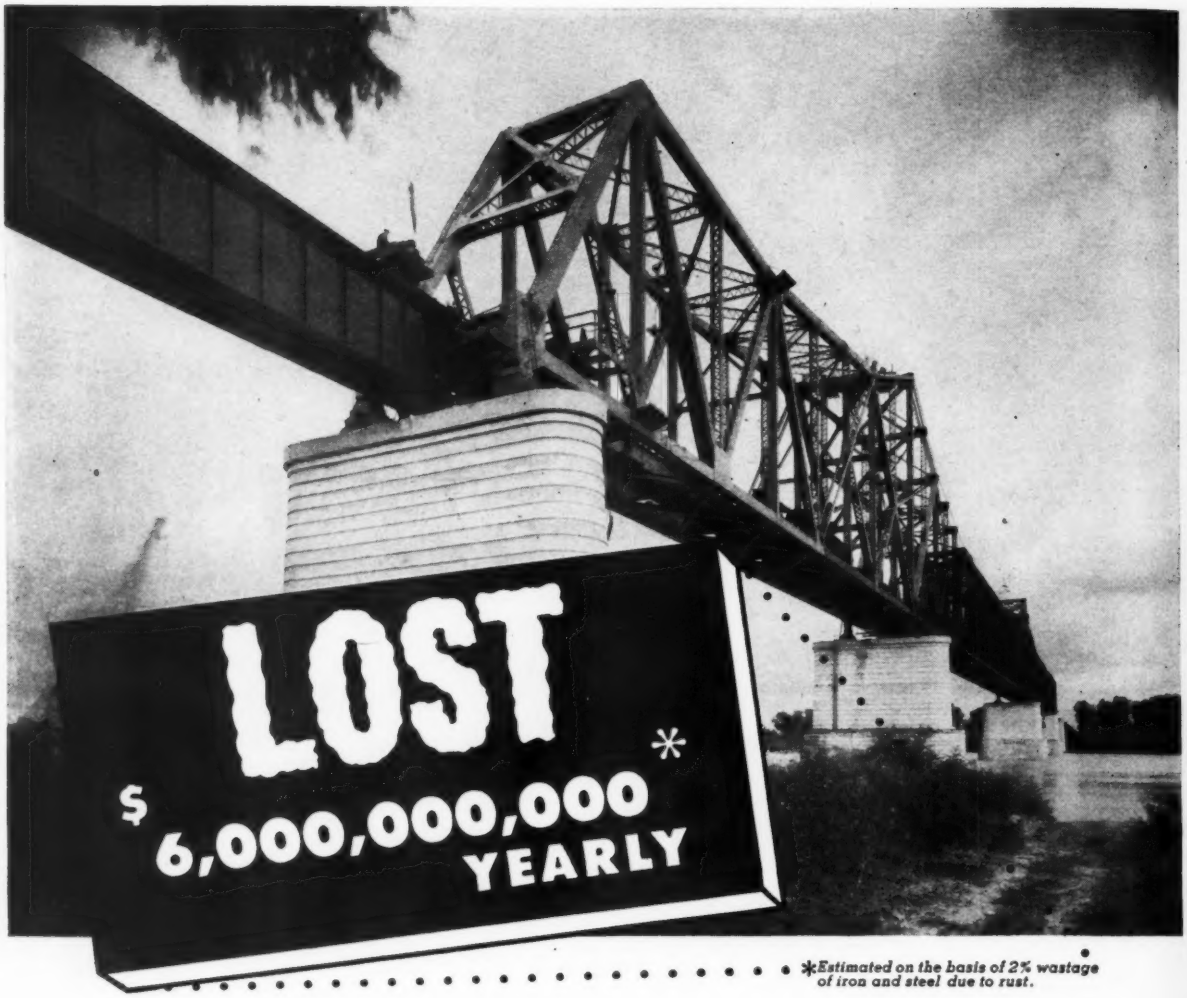
OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: ATLANTA • BIRMINGHAM • BOSTON • CHARLOTTE • CHICAGO • CINCINNATI CLEVELAND • DALLAS • DENVER • DETROIT • FORT WORTH • HELENA • HOUSTON • JACKSONVILLE KANSAS CITY, MO. • LITTLE ROCK • LOS ANGELES • LOUISVILLE • MINNEAPOLIS • NASHVILLE NEW ORLEANS • NEW YORK • OMAHA • PHILADELPHIA • PORTLAND, ORE. • RICHMOND ST. LOUIS • SALT LAKE CITY • SAN ANTONIO • SAN FRANCISCO • SEATTLE • SPOKANE • TULSA

1037-1



*Estimated on the basis of 2% wastage of iron and steel due to rust.

You pay a share of this tremendous loss, if you fail to protect iron and steel surfaces from the metal-consuming "fire" of rust.

RUST-OLEUM STOPS RUST!

For less than a cent per square foot material cost, you can add years of life to bridges, signal equipment, water tanks, rolling stock and other property. RUST-OLEUM will positively stop and prevent rust. It penetrates surface rust and incorporates it within the protective film—a water-tight, air-proof, rust-inhibiting coating that does not crack, blister or peel.

EASY TO USE . . .
LASTING PROTECTION

APPLY BY BRUSH, DIP OR SPRAY

RUST-OLEUM SAVES LABOR 3-Ways!

1. IT Cuts Preparation Time!
No sandblasting or chemical cleaners are necessary. Wirebrushing removes paint scale or blisters, dirt, etc.

2. IT Goes On Faster!
Rust-Oleum saves 25% of the time ordinarily required for the application and covers 30% more area than ordinary material—*an important saving.*

3. IT Lasts Longer!
As a protective coating, Rust-Oleum outlasts paint two to ten times on most jobs. This means *extra* savings.

Get the facts—NOW! Write today for Catalog No. 145 for recommended applications.

RUST-OLEUM CORPORATION

2417 Oakton Street • Evanston, Illinois

Parade of Power

INTERNATIONAL TRACTORS CLEAR THE WAY FOR THE RAILS

Hurry! A roadbed quick for the New York Central to serve a new, important manufacturing plant!

A fleet of six International Diesels, that lay their own ground-gripping tracks, answers the call with bulldozer blades and capacious scrapers. In ten roaring days they move 94,000 tons of earth... and the job is done!

That's the kind of performance that's needed these days on heavy construction jobs all over the land.

It's trouble-free, time-defeating performance when Internationals take over. It's economical performance, too, for these mighty Diesels operate on low cost fuel, converting every ounce of it into work well done.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

Tune in James Melton on "Harvest of Stars" every Sunday, NBC Network. See Newspapers for Time and Station.

INTERNATIONAL INTERNATIONAL HARVESTER *Industrial Power*

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

No Wonder Pumping Costs Go Up...

Badly encrusted water main. Debris removed from 160' of 18" sewer.

PPC Cleaning Methods Remove All Obstructions!

When water service and drainage systems begin to lag, it's time to get Pittsburgh's pipe cleaning experts on the job . . .

Special equipment and the know-how to do the job enable us to restore all sizes of water and sewer pipes to maximum capacity quickly and efficiently. All dirt, sand, cinders and scale are removed . . . as are all obstructions such as stones, timbers, crowbars, shovels, and all manner of objects that somehow get into and become lodged in water lines and sewers.

Make certain that your water service and drainage systems are thoroughly cleaned and that *all* obstructions are removed. Clean pipes are efficient pipes, and Pittsburgh Pipe Cleaner gets them clean!

Complete Pipe Cleaning Service for
WATER MAINS . . PENSTOCKS . . RISERS
LATERALS . . SEWERS . . DRAINS
GAS LINES . . FUEL PIPES

CLEAN PIPES:
REDUCE PUMPING PRESSURE
LOWER PUMPING COSTS
SPEED UP WATER SUPPLY
INCREASE FIRE PROTECTION
AVOID FLOOD DAMAGE

PITTSBURGH PIPE CLEANER CO.

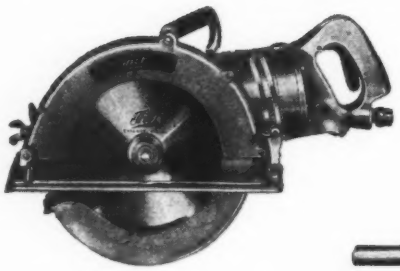
133 DAHLEM STREET . . . . . PITTSBURGH 6, PENNA.

PITTSBURGH, PHILADELPHIA, BALTIMORE, WASHINGTON, NEW YORK, BUFFALO, CHICAGO, CINCINNATI, ST. LOUIS, DETROIT

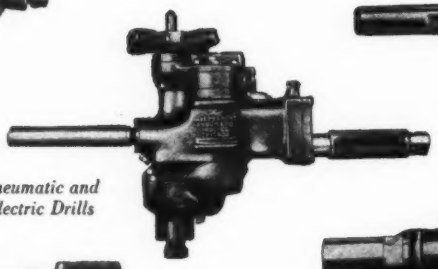
PUT *Thor* IN THE GANG..

Thor Breakers are available in a full range of sizes and styles for digging, tamping, spike driving, concrete breaking, driving sheeting and many other operations.

Thor Pneumatic Breakers are ideal for driving grouting points. Mud points are accurately driven with minimum effort mile after mile.



Pneumatic and Electric Saws

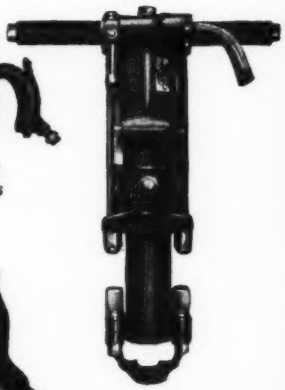


Pneumatic and Electric Drills

Riveting Hammers

Chipping Hammers

Pneumatic and Electric Grinders

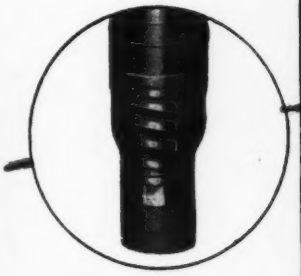


Sinker Rock Drills

For additional information, use postcard, pages 221-222

.....*to speed track and building jobs*

ALL ALONG THE LINE



Regular head is quickly replaced by special head for driving spikes.

Progressive track-laying is accelerated with the aid of Thor Pneumatic Breakers equipped with spike-driving heads.

Sump Pumps

This spring and summer, more than ever before, Thor Tools will figure vitally in the tremendous track and building program facing all railroads. More and bigger gangs will travel the sections, and with many will go the Thor Tools long established as time, cost and labor savers on all section jobs . . . grouting, spike driving, digging, tamping, rock breaking, chipping, sawing, drilling and riveting. Put Thor *power* . . . *speed* . . . *performance* in YOUR gang—call your nearby Thor branch today for demonstration.

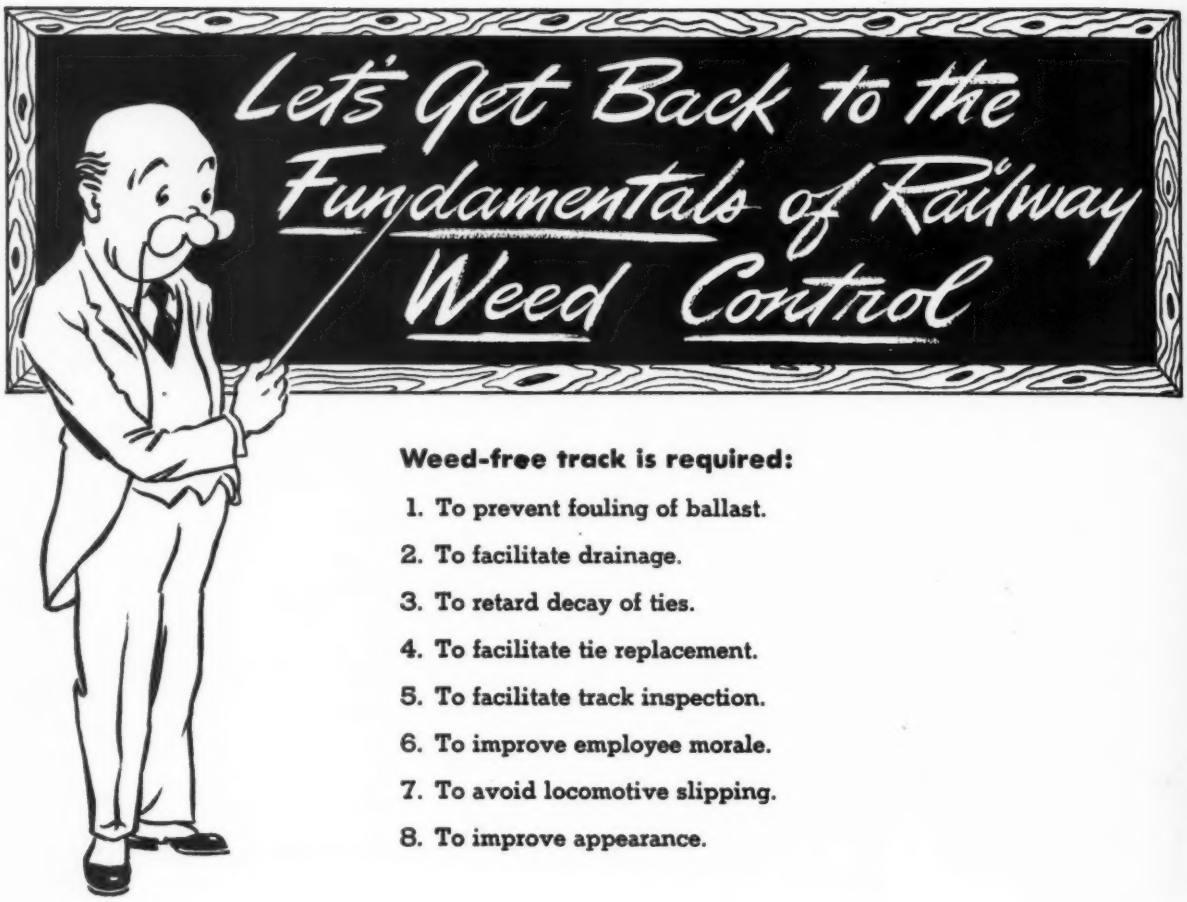
INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit Houston Los Angeles Milwaukee
New York Philadelphia Pittsburgh St. Louis St. Paul Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



Weed-free track is required:

1. To prevent fouling of ballast.
2. To facilitate drainage.
3. To retard decay of ties.
4. To facilitate tie replacement.
5. To facilitate track inspection.
6. To improve employee morale.
7. To avoid locomotive slipping.
8. To improve appearance.

Practical weed killing requires the eradication of weed *roots* as well as killing the tops of weeds. Live roots left after burning, steaming or discing of tops cause fouling of ballast and hasten tie deterioration.

Selective weed control chemicals should only be used in their proper place. And programs designed for agricultural noxious weed control are often unsuited to railroad requirements.

A Chipman program for the use of proven chemicals is the railroad's answer to practical weed control because it is designed to eliminate roots from the ballast, and is backed by over 35 years of experience in railroad weed killing. A well planned control program will achieve and maintain weed-free track at low cost.

Let us help you plan the weed control program best suited for your needs — as well as supply you with the proper chemicals.

CHIPMAN CHEMICAL COMPANY, INC.

Chicago, Ill. BOUND BROOK, N. J. Palo Alto, Calif.
Houston, Tex. Portland, Ore. No. Kansas City, Mo.

Manufacturers of

ATLACIDE • ATLAS "A" • CHLORAX • CHIPMAN 2, 4-D

2 Ways RED LEAD NEUTRALIZES ACIDS ...Retards Rusting

Those responsible for making metal last have long accepted Red Lead as the "standard" metal protective paint.

Now scientific research discloses sound reasons why Red Lead gives plus protection. For example, one important factor is Red Lead's ability to counteract the acid conditions which accelerate rusting.

Red Lead accomplishes this in two ways.

1. Red Lead Counteracts Environmental Acids: The uses to which structural steel is put normally expose it to acid environments. For one thing, it is usually subjected to the attacks of industrial gases and smoke. Certain of these, in contact with moisture, produce acid-forming compounds that speed up rusting. Then, too, pollution of waterways also results in acidity. Red Lead effectively neutralizes all such acids, and thus counteracts their rust-accelerating effect.

2. Red Lead Controls Inherent Acids: Many paint vehicles, such as linseed oil, synthetic resin varnishes and other commonly used types, *themselves* produce organic acids during the natural process of ageing. Many of these inherent acids, too, hasten corrosion. However, when Red Lead is the pigment in a metal protective paint, this rust-causing acidity is kept in check. Thus, a "controlled" acid level is maintained in the paint film. This is a singular property of Red Lead and contributes greatly to its film flexibility, impermeability and long life.

* * *

Remember that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including the fast-drying resin types.

Specify RED LEAD for ALL Metal Protective Paints

The rust-resistant properties of Red Lead are so pronounced that it improves any metal protective paint. So, no matter what price you pay, you'll get a better paint if it contains Red Lead.

WRITE FOR BOOKLET: *"Red Lead in Corrosion Resistant Paints"* is an authoritative guide for those who specify and formulate metal paint. It also includes typical specification formulas. For your copy, address nearest branch listed below.

* * *

The benefit of our experience with metal protective paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6. (National Lead Co. of Mass.); Philadelphia 7. (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va., (Evans Lead Division).

DUTCH BOY
Reg. U.S. Pat. Off.
RED LEAD

DOWELL

SUBSIDIARY OF THE DOW CHEMICAL COMPANY

need more water?

Increase water well production—the chemical way!

The record speaks for itself. Treatment results in Dowell files list the many production increases which have been secured through the proper chemical treatment of water wells.

The chemical removal of retarding incrustations on screens, tubing and pump equipment and the enlargement of formation pores permit the production of more water—faster!

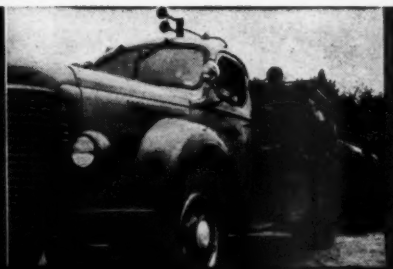
Dowell pioneered the well-acidizing field and its engineers have the know-how based on years of experience gained in treating thousands of oil, gas and water wells. Call the nearest Dowell office for a free estimate. Ask also about Dowell chemical scale removal service for water lines, steam generating and heat exchange equipment.

DOWELL INCORPORATED • TULSA 3, OKLAHOMA

New York, Philadelphia, Boston, Baltimore, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis, Kansas City, Wichita, Oklahoma City, Houston, Fort Worth, Shreveport, Mt. Pleasant, Michigan; Salem, Ill.; Borger, Texas; Wichita Falls, Texas; Midland, Texas; Lafayette, La. Long Beach, Casper: Dowell Associate—International Cementers, Inc.

Dowell's industrial engineers are selected for experience and ability—trained in the field and in the laboratory. Dowell's field equipment is scientifically designed to control, step-by-step, the complete scale removal process. Solvents are chosen and mixed to fit each individual job.

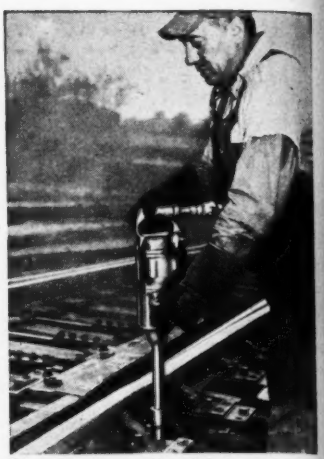
FREE SHOWING! *New 18-minute sound slide film illustrating the possibilities of Dowell Chemical Scale Removal Service. To arrange a special showing call or write Dowell.*



DOWELL

FOR INDUSTRIAL CHEMICAL SERVICE

New CP-5 Gasoline Tie Tamper starts with a downward push of starting handle. Dependable magneto-ignition—no costly battery replacements. Two-cycle engine operates on gasoline-oil fuel mixture, which provides complete lubrication. Balanced weight. Slender contour of lower end of tool gives unobstructed view of bar. Write for Bulletin 1943 — Maintenance-of-Way Equipment.



Speed screw spike driving and cut down operator fatigue with CP 365-RP Screw Spike Driver — light weight, good balance, minimum vibration, easily handled.

CP Reversible Electric Nut Runner applies and removes rail clip nuts in a matter of seconds. Cushion clutch relieves operator of torque reaction.

For spot tamping a CP Patrol Compressor and four CP-3D Pneumatic Tie Tampers are an ideal combination. CP-3D Tie Tampers are notable for easy handling and low air consumption. The CP Patrol Compressor, being entirely air cooled, is suitable for year-round operation.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

ADDITIONAL INFORMATION

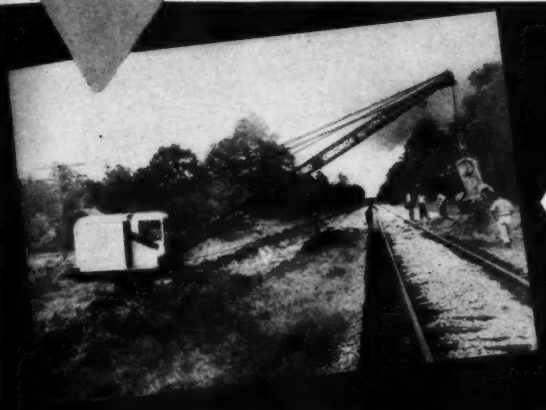
On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index

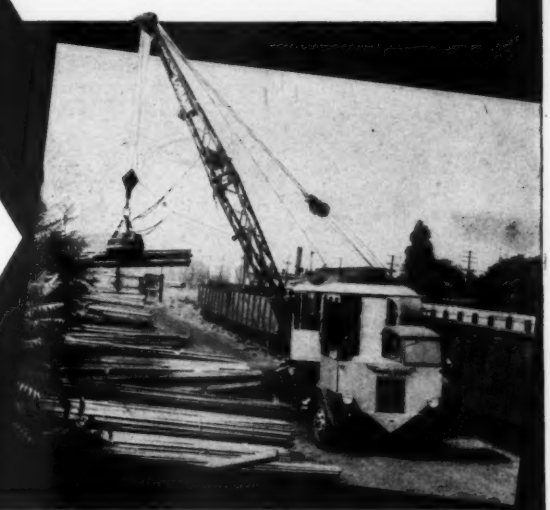
PRODUCTS INDEX (Continued)

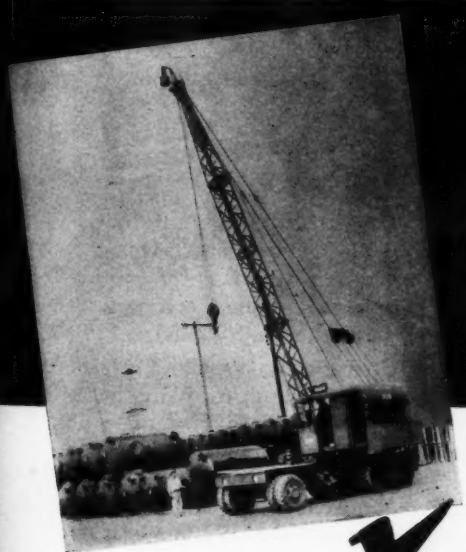
A "TRAVEL SERVICE" FOR RAILROADS!
Lorain Can Match the Mounting To Your Job



CRAWLER—Offers the advantages of off-the-track maintenance for those more extensive construction jobs where unit operates in limited area yet must travel rough, muddy terrain. Lorain chain drive crawlers provide 2 speeds in both directions. Operator can steer in either direction or pivot turn with turntable in any position. A perfect combination of power, traction and maneuverability in the ½ and ¾ yd. classes.

MOTO-CRANE—Here's "hurry up" crane service for dozens of widely scattered jobs. Travels the highway at speeds up to 33 M.P.H. —has ample low-speed power and soft-ground flotation for off-the-road travel to reach right-of-way. These rubber-tire, two-engine units feature 4 or 6 wheel mountings with or without front wheel drive; handle lifts up to 20 tons.





SELF-PROPELLED—Economical, localized on-the-job mobility for siding, freight and storage yard service. This one-man operated, single-engine unit travels at 4 speeds up to 7 M.P.H. and features air steering for easy maneuverability. Choice of 4 or 6 wheel mountings with or without front wheel drive. Forward utility platform is provided on carrier.

Front end interchangeability of *all* Lorain Shovel-Cranes makes them quickly adaptable for Handling Rails and Frogs; Fueling and Auxiliary Coal Storage; Cleaning Ash Pits; Handling Scrap; Storekeepers Yard and Road Service; Cleaning Ditches; Cleaning Ballast; Team Track Service; Heavy Lifts of all kinds; Bridge and other construction.

Reg. Trade Mark

thew-Lorain

THE THEW SHOVEL COMPANY
LORAIN, OHIO

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

no "hold-up" with the "build-up"

You can build up rail ends without holding up rail traffic . . . with an Oliver "Cletrac" crawler tractor on your maintenance crew. Equipped with a welder, this versatile unit works off-track . . . does not interfere with rolling stock. And since the unit is easily moved along the right-of-way, it eliminates the need for long cables.

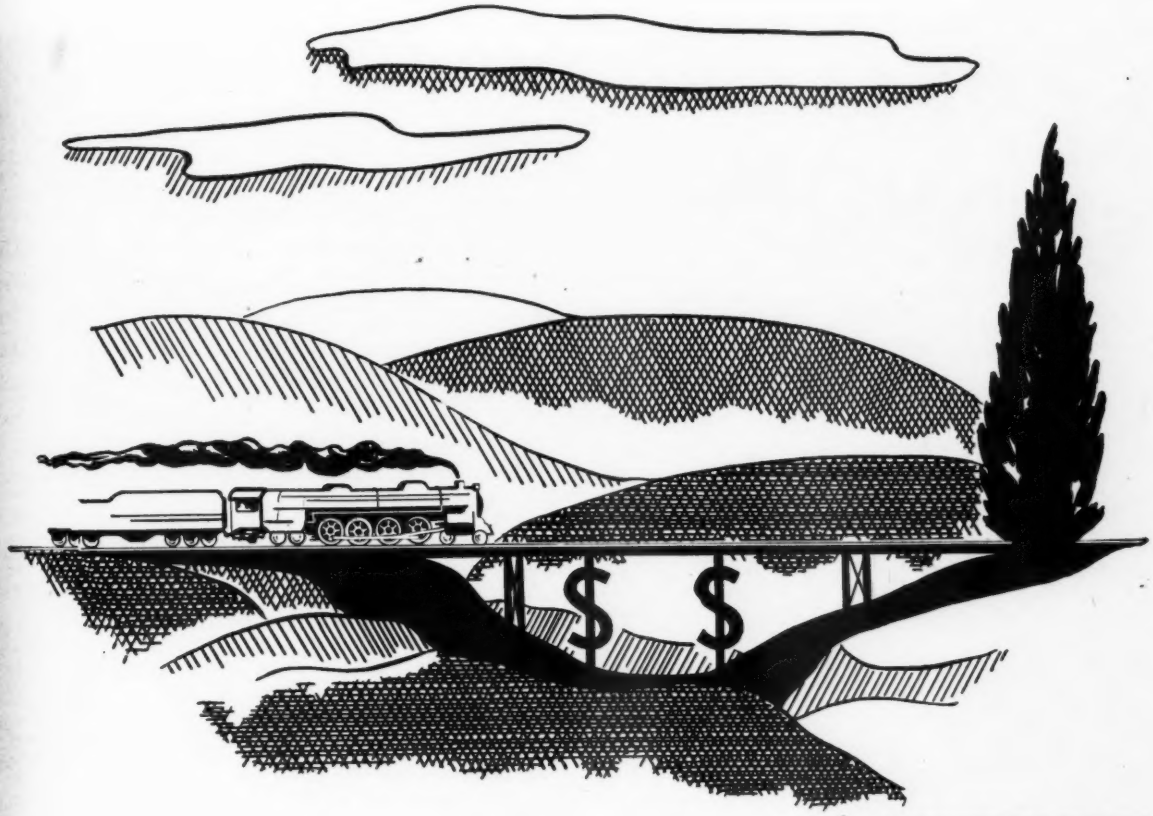
With a Cletrac on the job, expensive work trains can frequently be eliminated. With its various types of auxiliary equipment, it can be used for snow removal, tie tamping, ditch cutting and cleaning, grading, embankment building, and many other maintenance and construction tasks. Obsolescence is no problem with a Cletrac. Simply remove the outmoded welder, compressor, etc., and replace with a later model.

The sure-footed traction of Cletrac tractors permits them to climb over rails with ease . . . to operate efficiently on muddy or icy ground. To speed your maintenance work . . . investigate Oliver "Cletrac" crawler tractors for your jobs. The OLIVER Corporation, Industrial Division, 19300 Euclid Avenue, Cleveland 17, Ohio.

Cletrac

a product of The OLIVER Corporation

OLIVER
Cletrac
SALES
SERVICE



WHY PROP 'EM UP WITH DOLLARS

Are you another railroad man who is tired of pouring money into old timber structures? The simple, effective thing to do is replace them with ARMCO MULTI PLATE Pipe or Arches. It is the safe practical answer to recurring maintenance expense.

Your regular crew can assemble MULTI PLATE structures quickly and economically in any kind of weather. The sturdy corrugated plates are easily bolted together and no power equipment is needed. Work is done below track level and train schedules are not disrupted.

You'll find that ARMCO MULTI PLATE has ample structural strength to meet standard railroad loading specifications with a wide margin of safety. It is adaptable to unstable ground conditions and can be easily extended to widen the roadbed. Moreover, you can depend on MULTI PLATE to serve for years without attention. Maintenance costs go down.

Besides saving you money, ARMCO MULTI PLATE Pipe or Arches help your roadbeds meet high speed traffic conditions. For complete data just call our nearest office or write us direct. Armco Drainage & Metal Products, Inc., 1235 Curtis St., Middletown, O.

Another fire hazard doomed. ARMCO MULTI PLATE eliminates a source of maintenance expense without interrupting traffic. Struts are removed after initial settlement of the fill.

ARMCO

ARMCO MULTI PLATE

SPEED and ECONOMY on Wheels!

FINGERTIP AIR CONTROLS

⅜ YD. and ½ YD. SHOVELS
6 to 12 TON CRANES

No waiting — no delays! Out on the job or around the yard MICHIGAN Mobile CRANE'S time-saving, cost-cutting operating speed, economy and truck mobility pays off on every lifting and excavating job. Long-time MICHIGAN owners will tell you that for crane, clamshell, dragline, trench hoe and shovel work the fully convertible MICHIGAN Mobile SHOVEL-CRANE is truly "speed and economy on wheels"!

Get all the facts — send for Bulletin RE-37

MODEL TLDT-20 CRANE 12-ton capacity. Power lowering as well as lifting. Large heavy duty hoist drum for precision crane work. Timken tandem dual drive axle. Total reduction in low gear 72.88-1. Four Timken-Westinghouse Air Brakes. 30 MPH travel speed.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

"STEAD"

TRUE TEMPER

RAIL ANCHOR

Provides maximum economy and efficiency because of its . . .

Low initial application cost—Ease of application or removal—Adaptability to worn or corroded rail bases—Retains holding power after application—Long efficient Service.

Made and Sold only by

THE AMERICAN FORK & HOE COMPANY

RAILWAY APPLIANCES DIVISION

General Offices: Cleveland, Ohio • Factory: North Girard, Pa.

DISTRICT OFFICES:
2033 Daily News Bldg., Chicago, Illinois
105 Duane Street, New York, N. Y.

REPRESENTATIVES AT:
St. Louis, Missouri
St. Paul, Minnesota

Also makers of **TRUE TEMPER RAIL FORKS • RAIL JOINT SHIMS • BALLAST FORKS • TRACK SHOVELS SCOOPS • SCUFFLE HOES • AXES • HAMMERS • HATCHETS • SCYTHES • WEED CUTTERS**

Control Weeds Effectively—Economically!

2-4 Dow Weed Killer

Low Cost. Highly recommended for killing broad-leafed weeds in lawns to beautify parks, streets, and company buildings. Not harmful to most grasses. Available both as a liquid and a powder.

Esteron 44—a powerful 2, 4-D Weed Killer

Especially useful against many types of woody plants, such as wild rose, poison ivy, mesquite and sprouts of many other woody species. Ideal for use on cut-over land along rights of way. Not harmful to most grasses.

Dow Contact Weed Killer

"Chemical Mower" for weeds along canals, ditch banks, fences and roads. Kills most annuals completely. Destroys all weeds and grass above ground, leaves roots to prevent soil erosion.

Economical and effective control of many stubborn, troublesome weeds along highways and rights of way is now possible through proper application of the right Dow Weed Killer!

Maintenance men everywhere are pleased when field crews report that *spraying* weeds to death is so *simple*—saves so much *time*—gets such excellent *results!* And when the cost figures come in—when the dollars and cents savings prove the economy of chemical weed control—that settles it! No more mowing, digging or hoeing—it's Dow Weed Killer for *better* weed control!

Results of many tests and successful applications are available for your inspection. The complete story of Dow Weed Killers is yours for the asking—without obligation. Consult your usual source of supply—or write to Dow direct. Get the facts!

Cut maintenance costs with—

DOW WEED KILLERS

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

AGRICULTURAL CHEMICAL DIVISION

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis
Houston • San Francisco • Los Angeles • Seattle

Dow Chemical of Canada, Ltd., Toronto, Ontario

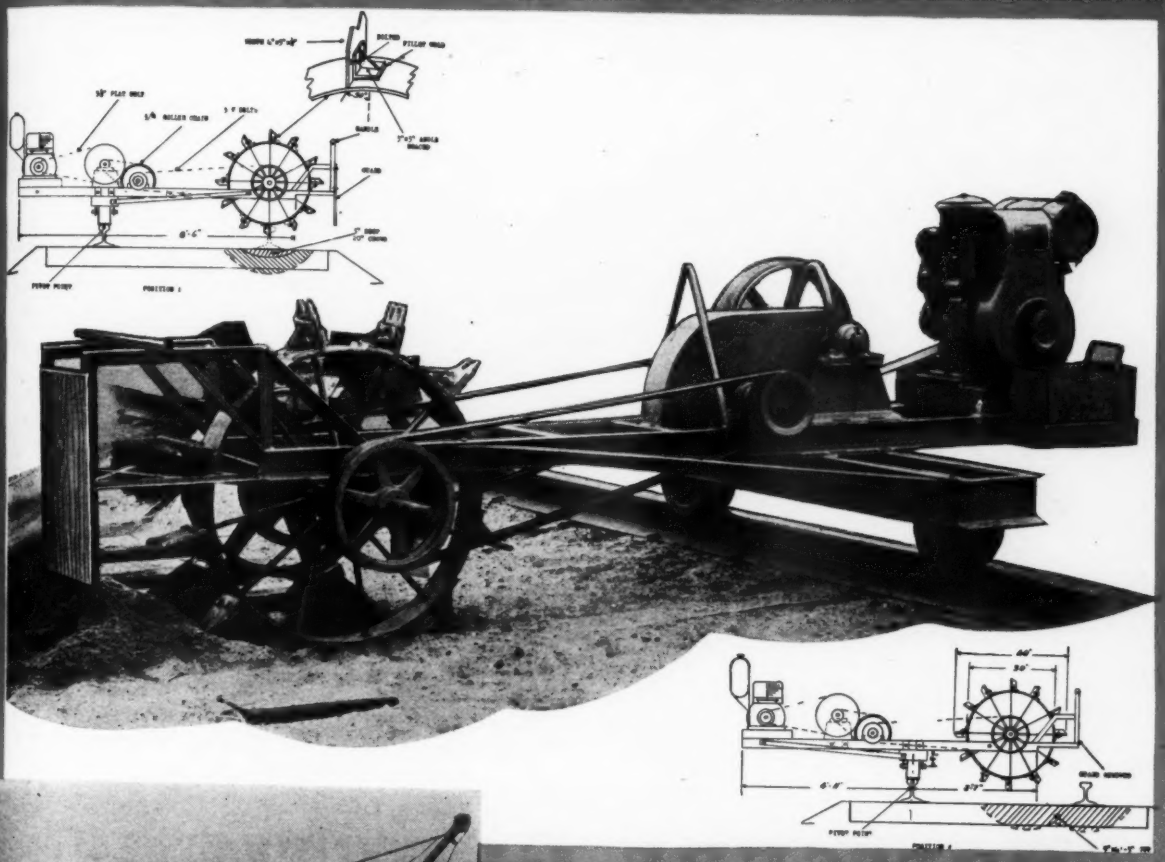
SAVE TIME, COSTS, DO IT BETTER

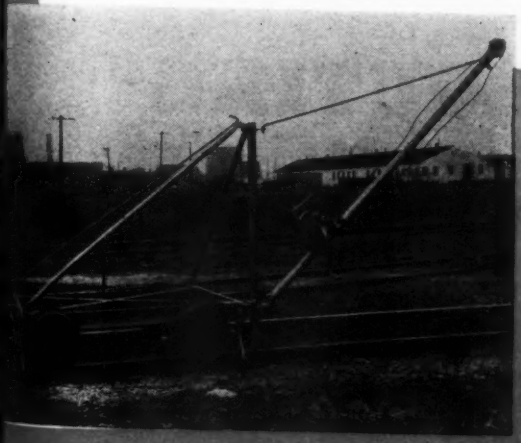
with the

KERSHAW

CRIBBING MACHINE

FOR RELAYING AND STRIPPING OPERATIONS





EXPERIENCE on numerous railroads and railroad contract work has shown that Kershaw Cribbing Machines will crib out for the adzing machine at the rate of 6,000 to 8,000 lineal ft. daily with two operators. Rotating brush sweeps tie clean for adzing in same operation. This machine will save 50% of stripping cost for single-tracking track. Total machine weight 900 lbs., counterweights 400 lbs.

TWO spike setters with two Kershaw Spike-Setter Carriages can set spikes for air hammers at the rate of one 39 ft. rail per minute. Carriage capacity 1½ kegs of spikes. Carriage weight 64 lbs.

WITH the Kershaw 2-ton rail derrick, removal and replacement of track-work equipment, and the handling of bridge timbers, frogs and switches are possible with a minimum of time and labor. The derrick is completely demountable. Ample anchorage is provided by the two rail adzading rail-clamp links. Four men can easily lift car from track.

WRITE US FOR COMPLETE INFORMATION ABOUT THESE TIME AND COST-SAVING MACHINES

RAIL DERRICK
RAIL LAYING CRANE
TIE NIPPER
CRIBBING MACHINE

THE KERSHAW COMPANY, INC.

MANUFACTURERS OF RAILWAY MAINTENANCE EQUIPMENT

MONTGOMERY, ALABAMA

Phone 33581 Box 518

BALLAST PLOW
AND
TRACK DRESSER
BALLAST STRIPPER
SPIKE CARRIAGE

1. On New York Central System tracks near Stevensville, Ontario, two pressure tanks were used to speed up the work.

2. No slow orders here as a fast New York Central freight train interrupts pressure grouting only momentarily near Oak Harbor, Ohio.

3. The foreman can tell from the pulsations of the injection line when grout is being taken.

PRESSURE GROUTING

returns own Cost and More in Reduced Track Maintenance

A decade of use in curing soft spots in subgrades has established pressure grouting with portland cement as both an engineering and an economic success.

AN ECONOMIC SUCCESS

One major railroad is saving $2,157 per month as a result of grouting 11,882 ft. of track—a saving which continues month after month, year after year. We will be glad to tell you of many projects on different railroads where the entire cost of grouting was returned by savings in maintenance within a few months.

AN ENGINEERING SUCCESS

Pressure grouting is a simple, positive method of eliminating water pockets or soft spots and increasing the load-bearing strength of subgrades. It is a standard maintenance operation on more than thirty-five railroad systems.

Engineering procedure and required equipment described in illustrated folder, "*Stabilizing Railroad Track by Pressure Grouting.*" Free in United States and Canada.

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Dept. A3-27, 33 West Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

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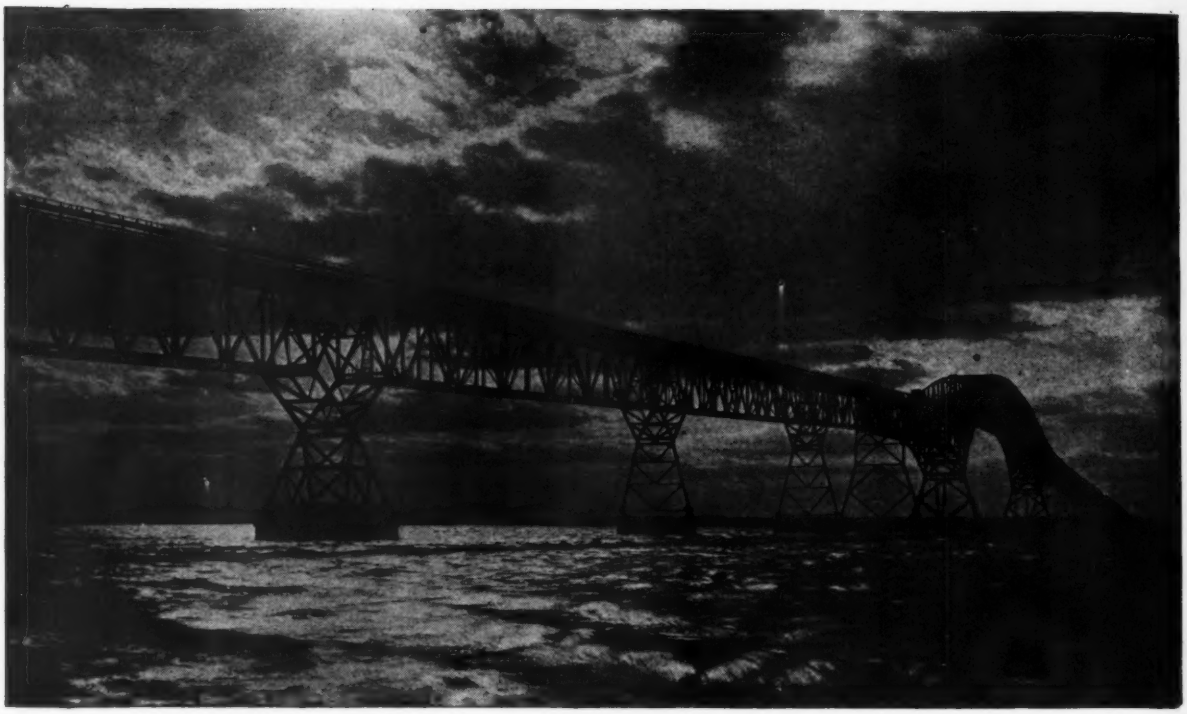

The building of the sub structure of this great highway bridge between Ludlow Ferry, Md., and Dahlgren, Va., by the Merritt-Chapman Scott Corporation involved the solution of construction problems of the first order including the driving of inclined steel "H" piles up to 215 feet in length

We fulfilled major contracts on these projects:

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Washington Bridge	Providence, R. I.
Waldo Hancock Bridge	Bucksport, Me.
Saginaw River Bridge	Saginaw, Mich.
Mount Vernon Memorial Bridge	Virginia
Lake Champlain Bridge	Port Henry, N. Y.
Narragansett Bay Bridge	Jamestown, R. I.
Cape Fear River Bridge	Wilmington, N. C.
Northeast River Bridge	Wilmington, N. C.
Eight Bridges, Union Pacific RR	Long Beach, Calif.
Poquetannuck Cove Bridge	Thames River, Conn.

Mississippi River Bridge, Memphis, Tenn. (now under construction)

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5-burner, 3-burner, 2-burner and 1-burner models available

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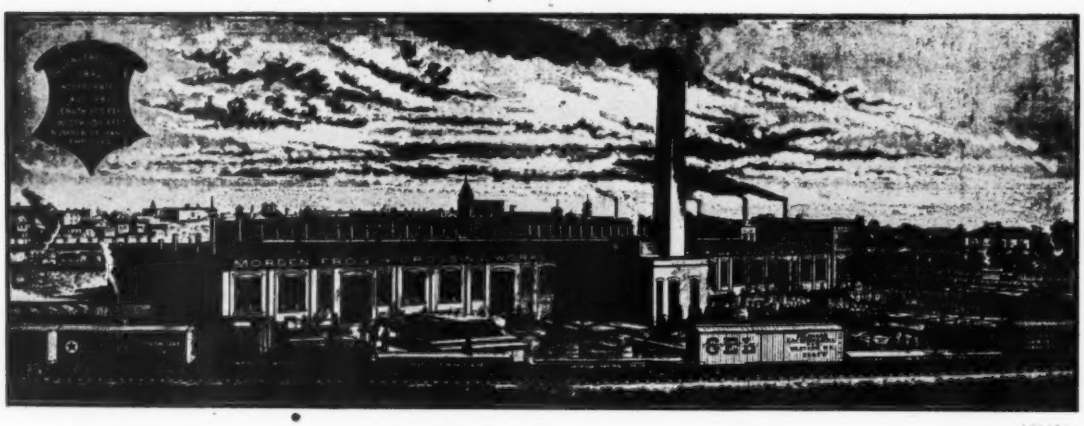

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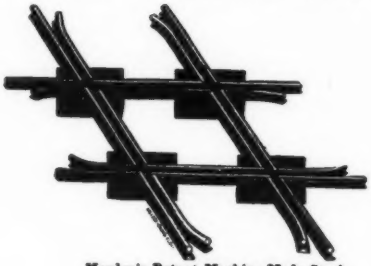
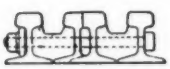
Morden's Patent "T" Rail Frog with Solid Steel Point.

Morden's Patent Solid Steel Frog Point.

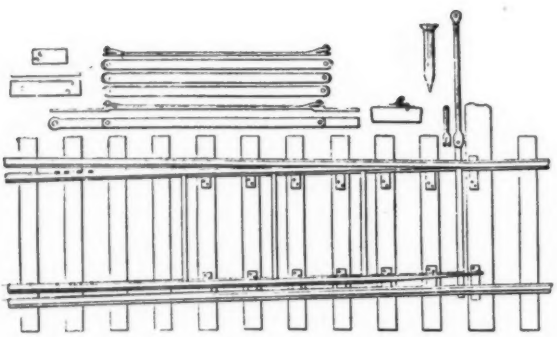
Cast Iron Stub Switch Chair.



Morden's Patent Machine-Made Steel "T" Rail "U Plate Crossing

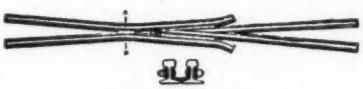


Machine Made Steel T-rail Wrought-iron Filled Frog.



15 Foot Steel T-rail Split Switch.

Machine Made Steel T-rail Riveted Frog.



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1947 — SIXTY YEARS OF PROGRESS — 1947

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Representatives in: CLEVELAND, OHIO; NEW ORLEANS, LA.; LOUISVILLE, KY.; ST. LOUIS, MO.; WASHINGTON, D. C.

GENERAL VIEW OF WORKS AT CHICAGO HEIGHTS

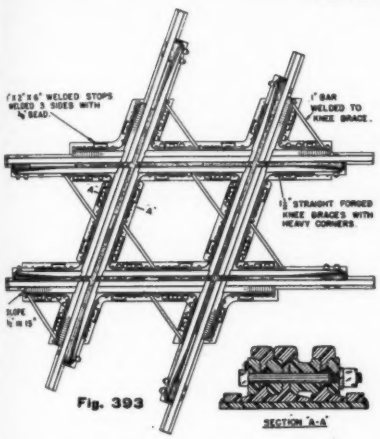

Fig. 393

Morden SECURITY CROSSING

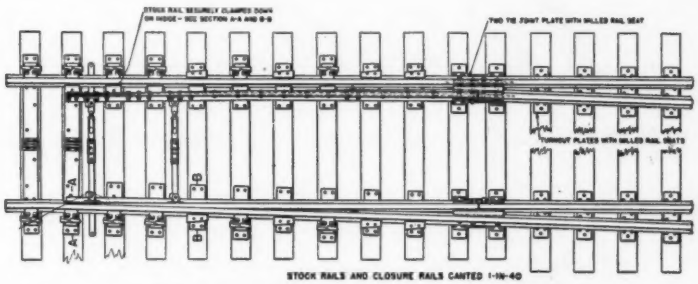

Fig 400

SECURITY SPLIT SWITCH

MORDEN SECURITY ADJUSTABLE RAIL BRACE

In Service on Major Railroads Since 1920

FOR SAFETY - IT'S Morden

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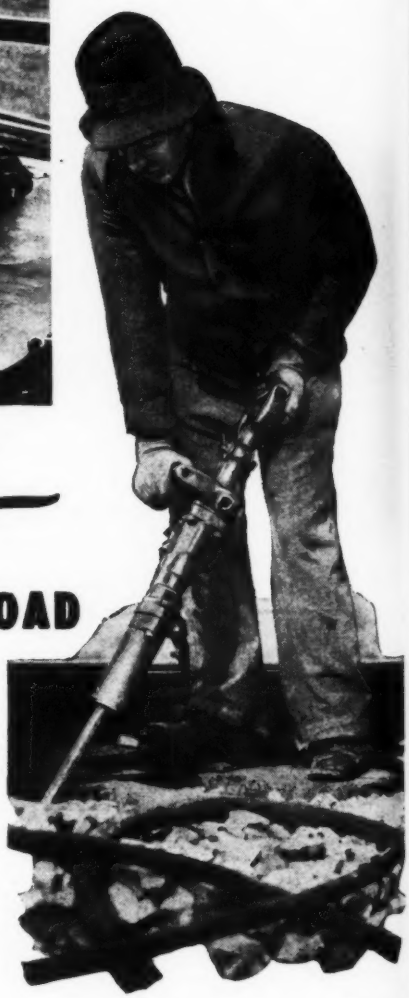
Teamwork—

YOU'RE TALKING ABOUT A RAILROAD



Yes sir, it takes all kinds of teamwork to keep a railroad running on schedule. Each job, whether large or small, is an important part of the whole system. No small part of the splendid teamwork is the result of demanding and using the best possible equipment, especially the tools required for maintenance.

The TRACK, for instance, if not properly maintained, can spoil the rest of the teamwork. That's why most railroads use mechanical tamping, originated by Ingersoll-Rand. Most railroads use I-R air-operated MT-3 Tie Tampers—they are the lightest tampers available. The machine does the fatiguing work while the operator simply guides it.

Improve your teamwork and TRACK by using Ingersoll-Rand tie tampers and I-R off- and on-track air compressors.

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CF&I TRACK BOLTS are given full heat treatment to develop a totally "Sorbitic" structure thus assuring the maximum toughness. The uniformity and dependability of CF&I Track Bolts provide ...A minimum of track maintenance–Better joint maintenance–and Reduced maintenance costs.

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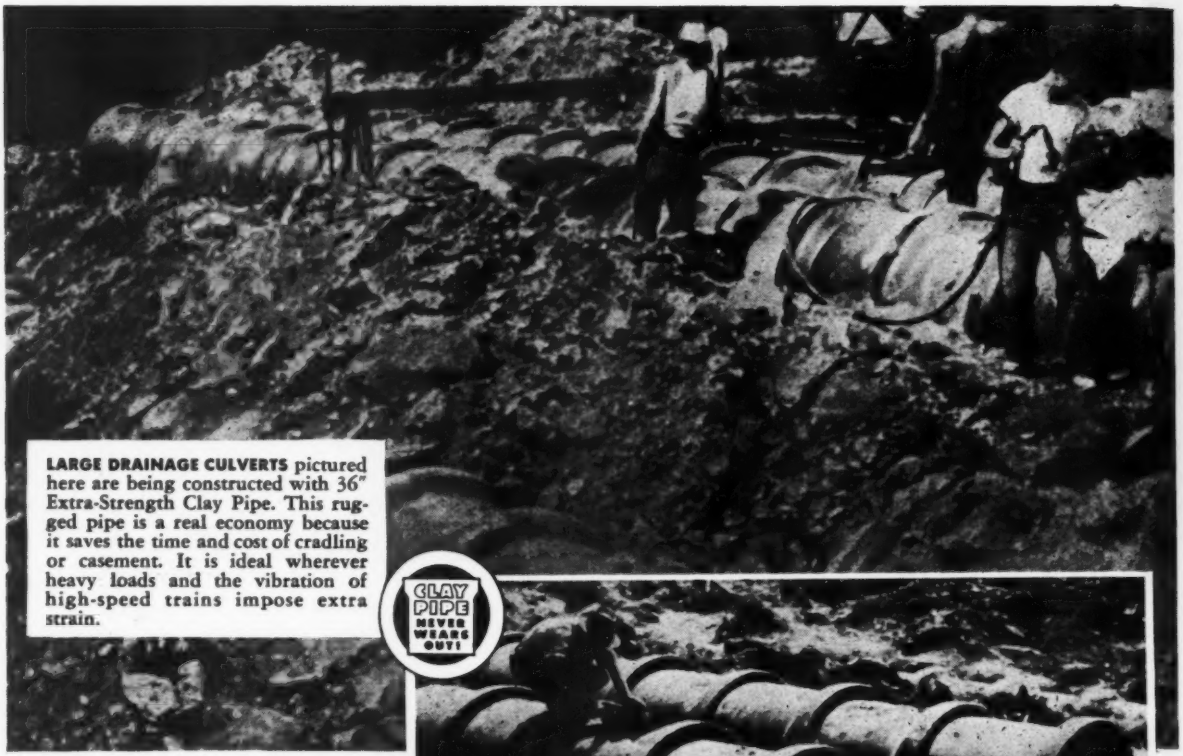

LARGE DRAINAGE CULVERTS pictured here are being constructed with 36" Extra-Strength Clay Pipe. This rugged pipe is a real economy because it saves the time and cost of cradling or casement. It is ideal wherever heavy loads and the vibration of high-speed trains impose extra strain.

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"AFTER 22 years of taking jacks apart—checking them for wear, replacing worn or broken parts—I have learned what makes one kind better than another. I see how the good design and workmanship of Duff-Norton Jacks prevents trouble.

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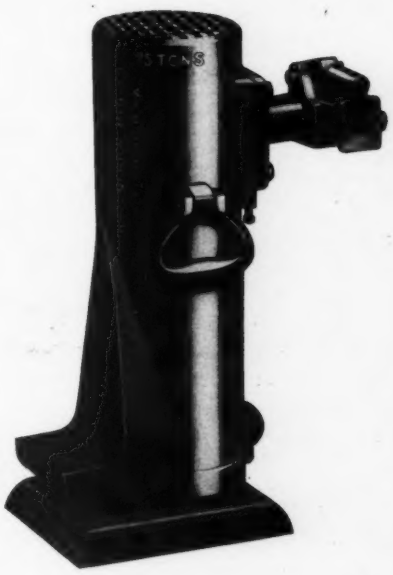
"I find Duff-Norton Jacks easier to repair than other jacks, mainly because they are of simpler construction and cleaner design. That's what saves time in the repair shop.

"Some of the Duff-Norton Jacks I've repaired have worked for this railroad longer than I have. Although these old jacks were good in their day, they can't compare with the ones Duff-Norton is making now. If they keep on improving them, and we keep on buying them, I'll be out of a job!"



You should know your jacks, Mr. Repairman—and we appreciate your kind words about Duff-Norton Jacks. Our representatives are always glad to work with you in getting parts for maintenance and repair and will gladly furnish instruction sheets and catalogs for your use.

The DUFF-NORTON Manufacturing Co.

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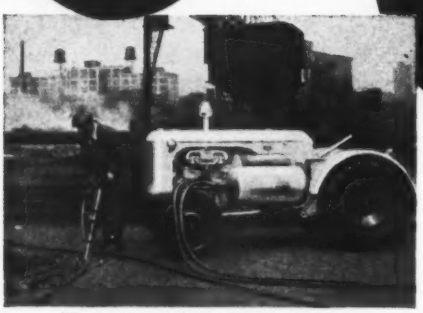
(BUILT BY THE MAKERS OF FAMOUS LE ROI ENGINES)

speeds right-of-way maintenance



"Tractair" mobility is ideal for station platform maintenance

"Tractair" makes short work of spike-driving and tie-tamping.

The Le Roi "Tractair" is a self-propelled, pneumatic-tired tractor-compressor that combines all of the features of an efficient, mobile 105 c.f.m air compressor with the flexibility and utility of a 35 h.p. wheel tractor. All pneumatic tools used in railroad maintenance that can be operated from a 105 ft. compressor can be handled efficiently by the "Tractair." The large pneumatic tires are equally as adaptable to adverse right-of-way conditions as they are to paved terminal facilities.

A complete line of interchangeable "front end" equipment such as loader, snow plow, rotary broom, back-fill blade, cargo and material lifts, crane arm, etc., as well as a mobile magnet pickup for cleaning scrap iron from right-of-way are now being developed.

For complete details and bulletins write to the Railroad Sales Dept.

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COLISEUM, CHICAGO
MARCH 17-18-19-20, 1947
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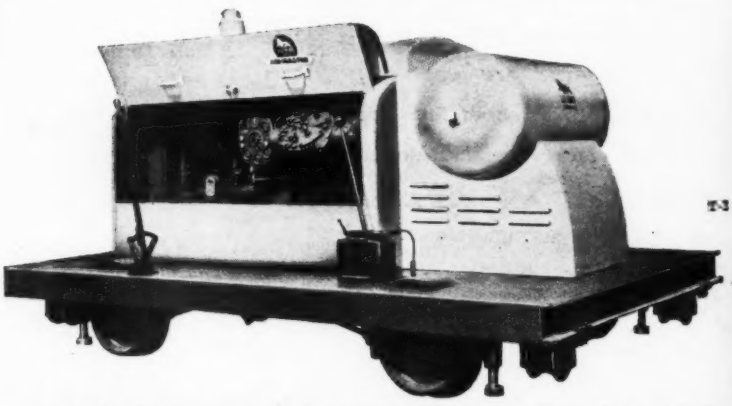

T-3

Le Roi Rail Car Compressor furnished in self-propelled or non-self-propelled models. Sizes: 105, 160, 210 and 315 c.f.m. with gasoline or Diesel power. Chilled wheels, hydraulic jacks, and electric starting are standard equipment

For additional information, use postcard, pages 221-222

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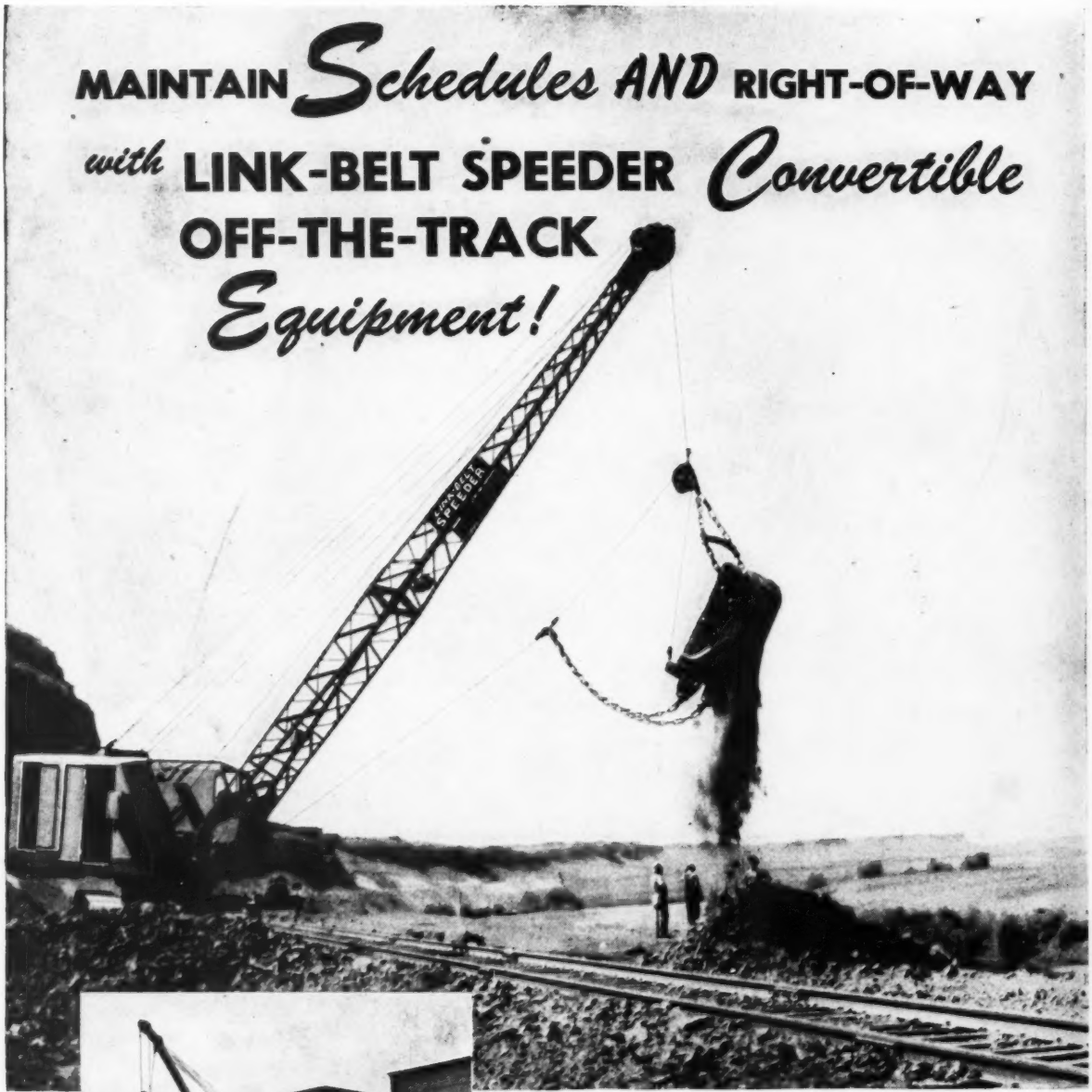

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Routine or special work on the right-of-way goes forward with no interference with traffic, when crawler-mounted, convertible, Link-Belt Speeder machines are used — and more *kinds* of work are accomplished, because they are so easily, quickly converted to different front-end attachments. Built for long lives of trouble-free service.

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No. 219 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: Another Equipment Economies Issue

March 1, 1947

Dear Readers:

For the twenty-ninth consecutive year, the March issue of Railway Engineering and Maintenance is again devoted almost entirely to the development, use and maintenance of power tools and machines designed specifically to help you in your work. In compiling this issue we have again stretched ourselves to do a good job, and we hope that you will find our efforts of real value.

In the 94 pages of advertising and 58 pages of text in this issue, we bring you a veritable catalog of the latest developments in maintenance of way and structures work equipment, based on information gained by mail, travel and interviews with railway and railway supply men in all parts of the country. In the March of Machines section—a review of new or improved equipment previously described during the year—and in the Products of Manufacturers' pages, more than 60 new or improved units are illustrated and described, among which you may find solutions to many of your problems in the months immediately ahead.

While we have tried diligently to cover the field, we know that there have been other developments that are not covered, in at least some cases because of conditions beyond our control. Furthermore, we would be the last to contend that, in view of the limitations imposed by one issue, we have given you all the information that you may want about the equipment described. To do so, in itself, would take volumes. All we could hope to do is to bring these developments to your attention and give you the highlights concerning them.

It is with this in mind that we include again in this issue a complete products index, on special insert stock, containing two addressed, permit-stamped post cards, on which you can conveniently request additional information on any of the equipment, appliances, tools or materials illustrated or described—anywhere in the issue, from cover to cover. All you need do is indicate by name and page number the products concerning which you want additional information. We will do the rest.

Some of us are pretty ragged as this issue goes to press, even as many of you have been after some sustained effort in your work, but if you get the maximum amount of help out of this issue—the advertising pages, the feature articles, the new products section, and the What's the Answer columns—and find the products reference insert of value in bringing you additional information—we will feel more than repaid.

Sincerely,

Neal D. Howard
Editor

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OF ALL THE CARS IN SERVICE TODAY MORE THAN HALF ARE FAIRMONTS

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MARCH, 1947

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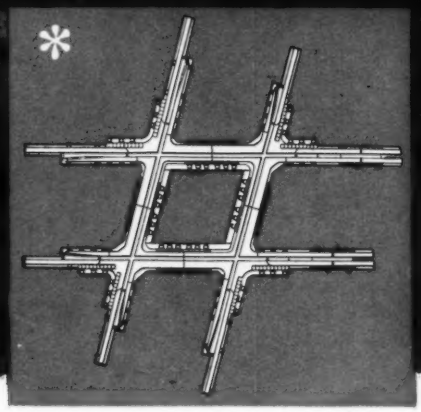
A PRODUCT OF BRAKE SHOE RESEARCH

Depth Hardened



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Railway Engineering and Maintenance

Steel—

The Crying Material Need of the Railroads

When the railways can't get the steel required for the necessary maintenance and expansion of their equipment and fixed properties—no matter what the reason—everyone in the country may well suffer—the railroads themselves, industry generally, and the public. And not for a long time have they been getting the steel they need for cars and locomotives, for rail, and for many other purposes—not during the war years, for the reasons which are well known, and not since the war, for reasons that are far less clear. This may answer in large part the question being raised in the minds of many, including shippers, passengers, and many railway men themselves, why the railroads have not done the job since the war that they promised they would do, in rehabilitating and modernizing their properties to assure adequate and improved service.

The railways, of all industries, cannot survive without steel. In spite of the huge volume of other materials included in their purchases, steel is essential in almost every element of their properties. Without a sufficient quantity, their properties cannot meet the demands made on them—and that is exactly what has been happening. Witness the inability of the roads to supply enough freight cars to shippers during 1946, a situation that is growing worse, with little hope of improvement, unless the railroads can secure more steel, because, such new construction as is underway to the contrary, the number of freight cars in existence is declining when it should be increasing.

The railroads had a maximum shortage of 42,141 freight cars during the peak of traffic in the fall of 1946. With a ratio at the time of cars on line to cars loaded weekly, of 2.1, it is indicated that they would have needed, theoretically, 88,000 cars more than they had to have avoided a shortage in 1946. Against this need, only 41,955 cars were built in 1946, while, of necessity, the Class I roads alone had to retire almost 80,000 cars during the year. The result—these roads ended the year with an ownership of 1,740,000 freight cars, which was 20,000 fewer than they owned at the beginning of the year. Why? Largely because of an inadequate supply of steel.

Furthermore, not only are insufficient freight cars being built, but the current supply of materials being made available to the roads is inadequate to keep at a minimum the number of cars out of service awaiting repairs. At the end of 1946 the number of railroad-owned cars awaiting repairs was 4 per cent of the total. If materials had been available to have reduced this ratio to the 2.8 per cent level attained in the war year 1944, the railroads would have had 20,000 more cars for use by shippers than they were actually able to supply.

And, as is only too well known to engineering and maintenance officers, there has been a long-standing inability to secure steel rail in the quantity desired, as well as many track fastenings, not only continuously throughout the war, but extending up to the present time. During 1946, when it was anticipated that the roads would be able to replace a large amount of the rail which was worn out with the punishment of the war years, they were, in large part, due to the unavailability of new rail, unable to equal even their war-time rail-laying programs. According to preliminary estimates, the Class I roads in 1946 laid only 1,238,145 gross tons of new rail in replacements and for new and additional tracks, which compares with 1,633,693 gross tons laid in 1945, and 1,582,867 gross tons in 1944. Furthermore, the 1946 figure compares with an average of 2,010,938 tons a year during the period 1923-1929, the first part of which, at least, had an economic "climate" closely paralleling that which prevails at the present time.

(*Continued on next page*)

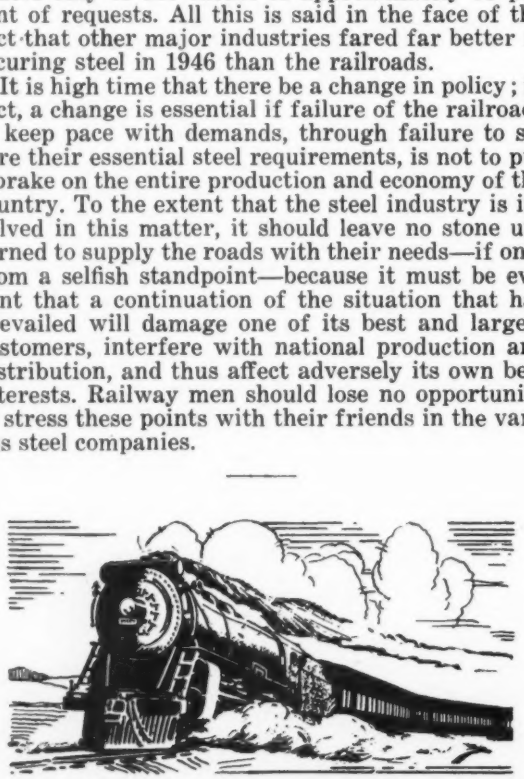
What is the outlook for the needs of the railroads for steel in 1947, and what are the prospects of their being able to secure enough steel to fill these needs? It is estimated that the roads will require approximately 120,000 new freight cars in 1947 merely to eliminate acute car shortages. Actually, a surplus of about 60,000 cars will be necessary, as a practical matter, to eliminate all shortages, which would call for a program of construction involving a total of 180,000 cars in 1947 to meet all requirements.

If the railroads are to secure only their minimum requirements of 120,000 new cars this year, 2,148,000 tons of steel will be needed for this purpose, which is 1,397,000 tons more than were supplied to them in 1946. Add to this the essential needs of the roads for 1,872,000 tons of steel in 1947 to maintain their freight cars in a satisfactory state of repair, and the total needs for steel for freight cars alone, exclusive of the needs for the construction and repair of locomotives and passenger cars, amount to approximately 4,000,000 tons.

For new rail, indications are that the railroads should lay in excess of 2,000,000 gross tons in 1947 for replacements alone, to overcome deferred renewals of the past four or five years and meet current requirements. This compares with the approximate 1,218,000 gross tons laid in replacements in 1946. Whether, under the economic conditions that will prevail, the roads will actually seek this much rail in 1947 is highly questionable, but it is significant that the budgets of a large majority of the roads for the year call for increases in rail renewals —in at least one case up to 300 per cent—over 1946.

The question is not so much the exact quantity of rail that the railroads would like to lay, but whether they will be able to secure from the mills anywhere near the amount they may desire to lay, reports being current that, as a whole, the mills are accepting orders only to the extent of approximately 75 per cent of requests. All this is said in the face of the fact that other major industries fared far better in securing steel in 1946 than the railroads.

It is high time that there be a change in policy; in fact, a change is essential if failure of the railroads to keep pace with demands, through failure to secure their essential steel requirements, is not to put a brake on the entire production and economy of the country. To the extent that the steel industry is involved in this matter, it should leave no stone unturned to supply the roads with their needs—if only from a selfish standpoint—because it must be evident that a continuation of the situation that has prevailed will damage one of its best and largest customers, interfere with national production and distribution, and thus affect adversely its own best interests. Railway men should lose no opportunity to stress these points with their friends in the various steel companies.



Section Gangs—

Still Largely Using Hand Methods

THE widespread application of machines to track work has brought about something of an evolution in the track-maintenance organization. Formerly the section gang was the backbone of the maintenance forces. However, as more and more machines came into the picture for performing an increasing number of maintenance tasks, the railroads found it necessary to place them in the hands of specialized gangs, which then took over a considerable portion of the work formerly performed by the section forces. Consequently, the section gangs on most roads, with their work consisting for the most part of spotting, policing and inspection, became much smaller.

With a few exceptions little progress has been made in extending the benefits of mechanization to these smaller section gangs that prevail today. Generally, the methods and tools employed by such gangs are basically the same as they were 25 or 50 years ago, except that practically all of them are carried to and from the job on track motor cars. Many roads have given careful consideration to the possibilities of putting more machines in the hands of their section gangs, but most of them have been deterred by the apparent obstacles imposed, such as the consideration that, because of the variety of jobs performed by individual gangs, any machines assigned to them would be idle a considerable part of the time.

However, the general lack of progress in this direction has not kept a limited number of roads from going ahead with plans to mechanize their section forces to an important degree. We refer particularly to those few roads that have equipped their section gangs with spot tie-tamping units. In so doing, such roads assert that they are realizing important economies and other advantages, stemming largely from the recognized fact that power tamping not only does a better and more uniform job than can be done by hand with picks, but that it does it faster, thereby allowing the section forces more time to devote to other necessary work.

A further consideration is that hand tamping comprises one of the most back-breaking and disagreeable tasks that the section forces are required to perform. For this reason, during periods of high industrial activity, when jobs are plentiful, the roads may experience difficulty in getting men to fill out their section gangs if it is known that tie tamping work must be done by hand. With power-driven machines available for tamping ties, this objection is not only removed, but possibly even replaced by a certain appeal to men who are mechanically inclined.

If further proof or evidence is required that spot tampers can be used successfully by section gangs it will be found in the fact that, so far as is known, every railroad that has equipped its section gangs on a large scale with such tampers is highly satisfied with the results.

What all this adds up to is that any road that is searching for means of putting the operations of its section forces on a more efficient and effective basis might profit greatly by making a thorough investigation of the possibilities of equipping these forces with spot tampers. Conceivably there are other machines that could be used effectively by these gangs, possibly under an arrangement whereby the equipment is assigned only as needed.

Budgeted Purchases of Rail-Laying Equipment for 1947 Are the Highest on Record

$15,000,000

For Work Equipment in 1947

In spite of the uncertainty of general business conditions, railway net earnings, and the material supply, the roads plan to purchase about 9,000 machines and tools

THE SHORTAGE of labor that has so plagued the railways in recent years, and which was offset only through the extensive use of power tools and machines, seems at last to have been resolved. In its place, however, the maintenance officers' dilemma has grown another horn in the form of increased labor costs—a horn that bids fair to continue to make such huge inroads into the maintenance dollar that punitive action against its effect is mandatory. Again, as in combatting labor shortages, the most effective weapon at the disposal of maintenance officers is the intensive use of work equipment.

Many of these officers obtained a great deal of experience during the depression years in holding down costs through the use of power machines and tools. Through this experience and the war years, they learned that, while there is no complete substitute for manpower in maintenance, power machines and power tools can be employed effectively to hold down costs and offset in considerable part a lack

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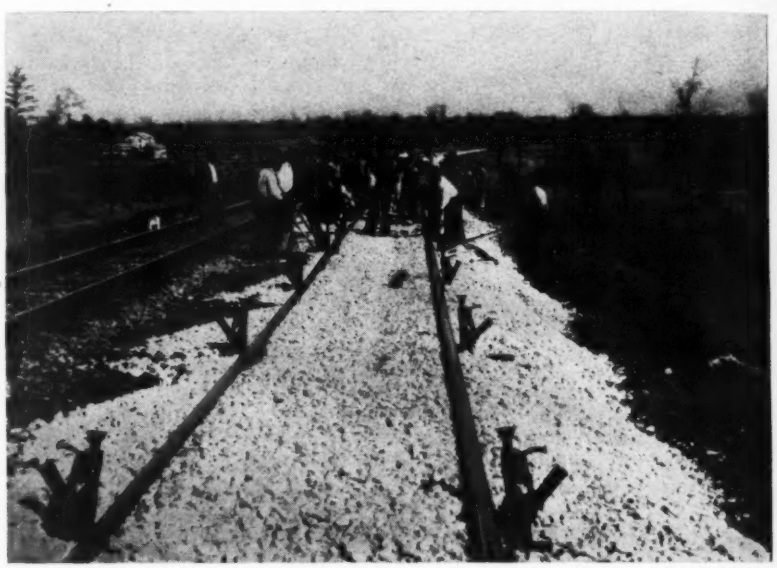
Right-of-Way Grading and Drainage Projects Planned for the Future Will Require the Purchase of Large Amounts of Earth-Moving Equipment of All Types

of man-power. That there was heavy reliance on such equipment throughout both periods is seen in the steadily rising volume of purchases throughout the depression, which were accelerated by the war and reached a peak in 1945. What machinery has done for maintenance in these past years, it can do just as effectively in counter-balancing the increased cost of labor and in meeting the necessity for maximum efficiency and economy in the days ahead.

The wage increases granted last year, only partially offset by the belated increase in freight rates made effective January 1 of the present year, and the questionable prospect of labor costs remaining stabilized, even at their present level, couple themselves to the uncertain industrial picture as a whole to form a train of serious problems for the maintenance officer as he attempts to plan the year ahead. He realizes that, while he has gained a lot in his race against the lack of material and labor during recent years, he still has ahead of him the problem of getting more out of his maintenance dollar than ever before, while faced with as much, if not more, work than at any time in the past. This work, in most cases, includes both the overcoming of deferred maintenance and improvements during the war years and the building of refinements into the track and structures to keep them abreast of the higher speeds and higher standards of service required to enable the railroads to meet the competition of other forms of transportation. As a result of their experiences, maintenance officers have come to realize that unless they mechanize their forces to the limit, they will be unable to carry out the work that must be done, with the economy that is essential.

To permit an analysis of how these officers plan to meet the situation confronting them, a number of them on a select group of roads were asked what types and what numbers of power machines and tools they expect to purchase in 1947. Replies were received from 29 roads, of which 22, representing 87,000 miles of lines, said they expect to purchase work equipment this year. The remaining seven replied, in effect, that, owing to "the uncertainty that exists in nearly all business at this time", to quote one road, they have made no definite budget arrangements.

Of the 22 roads mentioned, one gave the amount of money it expected to spend for work equipment, but it did not list the number or types of units it expects to buy; a second said it would purchase a normal number of machines; a third said it was already negotiating for certain classes of roadway machines, but did not identify them. Another said, "it is necessary to increase our purchases of labor-saving tools and machinery", but gave no indication of how many units it planned to buy. Eight of the remaining roads gave specific information on the probable purchase of more than 100 units each. Five of these indicated they would buy more than 200 units apiece, and one planned to obtain more than 300 units. A total of 2,389 units were included in the budgets of all 22 roads.



The Purchase of a Total of 1577 Units of Equipment Designed for Use in Surfacing Track, Is Planned for 1947

Good Year Ahead

On the basis of the foregoing information, it is estimated that the railways of the United States and Canada are planning to purchase approximately 7,400 units of the heavier types of equipment in 1947. In arriving at this figure, the actual number of units included in the budgets of the roads participating in this study has been extended to include all roads in both countries. The same method has been followed in estimating the number of units of individual types, which will be discussed later.

It should be kept clearly in mind, however, that the foregoing figure does not include any of the small, portable, power-operated hand tools, used principally in bridge and building work, of which a substantial number are purchased every year, although they seldom appear in the budgets for work equipment. Neither does the figure given include many of the portable tools, other than tie tampers, used by the track forces, nor certain other types that are seldom included in budgets for power machines, but which are purchased in considerable number throughout each year.

On the basis of the purchases of these smaller types in recent years, it is safe to assume that not less than 1,600 such units will be purchased during 1947. Adding these to the units about which the information given is more definite, the total number of units which the railways plan at this time to purchase in 1947 is increased to approximately 9,000, for which they will spend at least $15,000,000.

Another feature of work equipment purchases that should be kept in mind is that the budget estimates invariably fall short of actual purchases. In fact, the actual purchases normally exceed the budgets by from 10 to 40 per cent, so that the purchases for 1947 may even exceed 9,900 units.

Obviously, an analysis of the purchases of work equipment year by year is of value and interest to every maintenance of way officer, because it not only affords him a measure of the expanding use of this equipment in railway maintenance, but also the trends formed by changes in types of equipment. To permit such an analysis of the probable purchases in 1947, the chief engineers and engineers maintenance of way who were solicited for information concerning their plans were also asked to give detailed information with respect to the number of units of each type of equipment in their budgets.

In response to this request, 74 types

of power tools and machines were mentioned. This number does not include the small tools used in bridge and building work, except power saws, wood borers and power wrenches, and many of the smaller power tools used in track work, so that the actual purchases will represent a much greater number of types. The consolidated list, however, covers a wide range of types and sizes used in a wide variety of maintenance operations, including a large number of highway vehicles, such as automobiles, trucks and trailers; a large amount of heavy grading equipment, such as power shovels, draglines, carryalls, scrapers, tractors, bulldozers, front-end loaders, etc.; a record amount of almost every kind of machine used in laying rail and for its later maintenance; snow fighting equipment, paving breakers, welders, wood saws, and other tools. The foregoing comprises only a few of the 74 types that were mentioned specifically, for the complete list includes machines used for practically every maintenance operation for which power equipment has been designed.

As a result of the elimination of war controls over materials, the railways planned last year to lay a larger amount of new rail than in any year since the beginning of the depression, subject, as they said, "only to the availability of the rail". To accomplish that task, they planned to purchase an abnormally large amount of rail laying equipment, equal to 709 units. However, even when the amount of rail available again fell far short of their needs, they actually purchased 1,199 units of this equipment, as reported in the January, 1947, issue of the *Railway Engineering and Maintenance*.

Rail Equipment in Demand

The rail planned to be laid this year is again large, but many roads have already been advised by the steel mills that no more than 75 per cent of their requirements will be available. While this uncertainty in the availability of rail is reflected to a certain extent in the budgets for 1947, it has not deterred the roads seriously in planning their purchases of rail laying equipment, which are expected to include at least 925 units. While this is less than the number of units purchased last year, it is more than the railways planned to purchase at the beginning of the year, and more than has ever been budgeted in any year of record. The more important of these machines include tie adzers, bolt tighteners, spike drivers, spike pullers, rail cranes, rail layers, rail and bonding drills, grinders and saws.

While the budgets do not anticipate the application of any more ballast than they did last year, a large amount of out-of-face surfacing is being programmed, commensurate with the tonnage of rail to be laid. An indication of the volume of such work can be gained from the provision in the current budgets for the purchase of 595 tie tamping outfits, ranging from 4 to 12 tools, of both the pneumatic and electric types, and for 734 unit tampers. In addition, 248 other units, representing cribbing machines, power jacks, power ballasters, etc., are included in the budgets for the year. This makes a total of 1,577 units designed for use in surfacing track.

Highway Vehicles Desired

During recent years, when necessity required that practically all the automotive production of the country be allotted to the war effort, the railways turned, in many instances, to contractors and rental agencies for the transporting of their men and material. Now that highway vehicles are again available, they are including a larger number of such vehicles in their budgets. This is evidenced by their plans to purchase 693 units during the year 1947.

Weed eradication has always been consistently prominent in plans of maintenance officers, many of whom consider it a prime necessity, realizing that drainage is destroyed if the roadbed and ballast are not kept clear of weeds, and that an increased expenditure of labor is required to maintain good surface and line. In addition, if right-of-way vegetation is allowed to grow uncontrolled, it not only presents an undesirable appearance, but creates a hazard of fires that may destroy structures and delay traffic. Right-of-way fires are quite likely to extend themselves to private property and destroy crops, buildings and livestock, thereby leading to large claims. To avoid such risks, the 1947 budgets include 237 units of weed-destroyers, such as weed burners and weed mowers. In addition, a number of roads expect to make extensive use of chemical weed killers.

Earth Movers Prominent

Drainage has always been foremost in the thoughts of every maintenance man. His fight to provide or improve it has been waged with every machine and power tool ever built that would suit the purpose. Since the advent of off-track equipment designed to move large or small quantities of earth cheaply, the amount of both roadway and right-of-way drainage carried out has increased by leaps and bounds. That there is no intention of letting up on this kind of work is indicated by the budgeting of 414 units of earth-moving equipment for 1947. This is larger than that programmed for any previous year except 1945, when record purchases were planned. These units include power shovels; cranes fitted with clamshell buckets; draglines; pull shovels; tractors fitted with bulldozers, angledozers and front-end loaders; carryall scrapers; road rollers; graders and other such types of equipment.

Small Tools

As has been explained, no close estimate of the number of small, portable, power-operated hand tools to be purchased can be obtained from the budget information given, since in most cases only indirect reference is made to them, such as "sets of bridge and building tools", or so many "miscellaneous small tools". For this reason, any estimate of the number of these tools to be purchased must be based largely on previous expenditures for this type equipment. However, this year a large amount of bridge and building work is scheduled, due largely to the extensive deferment of such work in recent years because of the unavailability of materials. Thus, on the basis of past purchases and the outlook for sizeable programs of bridge and building work, it seems safe to predict that the purchases of portable, power-operated hand tools in 1947 will amount to about 1,600 units or about the average number purchased for the last several years. This estimate is strengthened further by the fact that 249 power plants, such as air compressors and generators, are included in the budgets, over and above those to be used exclusively with tie tampers, paint sprayers and welders.

Other types of equipment totaling many hundreds of units are budgeted for purchase during 1947. These types include concrete mixers, concrete vibrators, paint sprayers, portable pumps, rail and flange lubricators, snow plows and sweepers, derrick cars, ballast cleaners, roadbed-grouting outfits, and many other roadway machines.

A Good Omen

While the budgets indicate that the total number of units of work equipment scheduled for purchase this year is about the same as actually purchased in 1946, in many categories the number of units scheduled for purchase

(*Continued on page 292*)

Planning Equipment-Buy

Six chief maintenance officers discuss how budgets are set up; how units are selected; consideration to standardization; effect of obsolescence; and what is expected of manufacturers

EACH year the railways of the United States spend upwards of $15 million for power tools and machines for use by their construction and maintenance forces. In 1946 they spent approximately $15,400,000 for this purpose.

How are these large purchases planned and set up? What factors are taken into consideration? Who on the railways have an influence in the designs, types and number of units selected? The answers to these and related questions are contained in this symposium of statements by Bernard Blum, chief engineer, Northern Pacific; H. F. Fifield, engineer maintenance of way, Boston & Maine; S. R. Hursh, assistant chief engineer-maintenance, Pennsylvania; L. T. Nuckols, chief engineer, Chesapeake & Ohio; A. E. Perlman, chief engineer, Denver & Rio Grande Western; and G. L. Sitton, assistant chief engineer Southern. In some respects the answers differ, but on all of the roads involved the field forces play an important part in the types and designs purchased and the overall aim is to select those units that best fill the requirements, can take the gaff, and promise the greatest economies.

Time and Cost Studies Help Direct Equipment Purchases

By G. L. Sitton
Assistant Chief Engineer
Southern, Washington, D. C.

OUR railway system is divided into three approximately equal regions, known as Eastern, Central and Western Lines, with a chief engineer, maintenance of way and structures, in charge of maintenance activities on each region. These chief engineers, maintenance of way and structures, are constantly studying the benefits derived from machinery and power tools and make recommendations annually to the chief engineer. In addition, these men make special recommendations from time to time covering special cases and new types of equipment developed since their last annual recommendations.

Each chief engineer, maintenance of way and structures, in turn, has a supervisor of work equipment who is, along with the division engineers, constantly studying the advantages to be gained through the use of work equipment, and who is making recommendations to him.

Heading up our work equipment forces we have a superintendent of work equipment, reporting to the chief engineer, system, who is constantly engaged in the study of additional machinery, and who advises the chief engineer with reference to recommendations received from the line.

Our accounting engineer (who reports to the chief engineer) and his force are of value in helping the chief engineers, maintenance of way and structures, and their men set up and keep track of time and cost studies designed to developing the greatest savings possible through the use of machines. We are all anxious to spend our money for machinery that will do us the most good.

It cannot be said that, at present, we have any well-developed system for retiring and replacing the older pieces of our work equipment, but the setting up of such a system is now, and will continue to be, an active subject with us. We are scrutinizing the repair record of each of the older machines with the view of replacing those with the worst records. Furthermore, we are continually studying the performance records of different makes of machines, and we do not hesitate to exclude any type or make which has made a bad record on our road.

We expect a manufacturer's service man to install and put in service machines of new types, and the larger machines of older types, instructing our operators in the proper operation and maintenance of the machines. We also expect manufacturers to make good any defective parts, to supply us with a specified quantity of parts lists and instruction books, to follow up the performance of their equipment, and to listen to our suggestions as to improvements.

We have derived much benefit from the machinery we have purchased in the past, but it is impossible to state just how extensive this has been and how much money we have saved. All of the cost studies we have made have been samples here and there, rather than all-inclusive.

Convinces Management With Carefully-Supported Budget

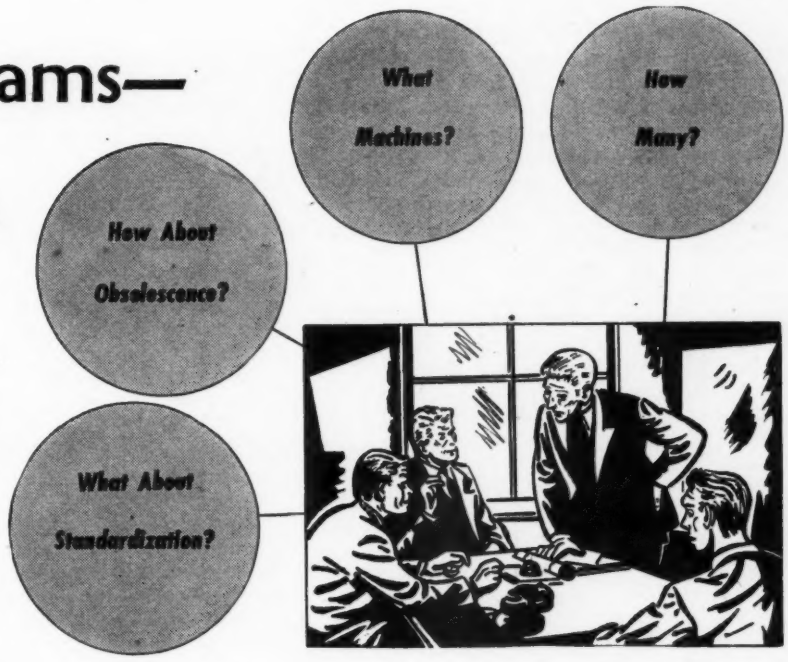
By H. F. Fifield
Engineer Maintenance of Way,
Boston & Maine,
Boston, Mass.

WE SET up a detailed budget early each fall which outlines the equipment we will require for the following year. This budget is made up in two main parts—one, covering the equipment required to replace obsolete existing equipment, and the other covering additional equipment. We also show in this budget, in the carry-over, the equipment included in the previous budget which we do not expect to receive before January 1. All of the items in this budget are grouped under the various life expectancies, our budget for 1947 showing equipment life expectancies of 5, 6, 7, 10, 15 and 20 years.

At the same time the budget is made up, a detailed statement is prepared

Buying Programs—

A Symposium



showing all equipment on the Boston and Maine as of January 1. This statement lists the original cost of all equipment, and shows the total annual cost to replace it on the basis of the years of life expected from it. It also lists the year in which each piece of equipment was acquired and the year in which it should be replaced in accordance with its age group. For instance, in our statement made to support our 1947 budget, we have equipment to the total value of $2,658,000. Of this, $1,785,000 is for MCB equipment, including $480,000, the value of our camp car equipment, and $873,000 for smaller miscellaneous equipment. The total annual expenditure necessary, on a life expectancy basis, to replace this equipment is $187,000, and, therefore, it becomes not too difficult a task, with the aid of this statement, to sell to our management the necessity for spending at least $187,000 annually for replacements.

Our new additional equipment has to be sold on its merits and the savings and other benefits expected as the result of its purchase, emphasis being placed during the last few years of course, on the largely increased cost of labor and its decreased efficiency. Anything we can do through equipment to increase the efficiency of labor is looked upon favorably by our management.

The budget is handled by the chief engineer with the president, personally, after which AFEs are made up and approved through our regular budget procedure, in the same manner as any other capital expenditure. We try to have the purchasing department place tentative orders immediately upon approval of the budget by the president, and thus far have been successful.

Comb Requirements Carefully

Programs for the purchase of work equipment are set up initially by our respective division engineers, and also by our supervisor of work equipment. These separate programs,are reviewed by the engineer maintenance of way with the supervisor of work equipment, and later they are reviewed again in a staff meeting of all our division engineers. At this meeting, after checking over the various items of equipment requested, the final program is agreed to by all concerned. The above procedure results in a thorough understanding of the equipment already available on the railroad, and in more or less standardizing of the additional equipment to be purchased.

Although we feel that certain definite types of equipment are essential and make our recommendation accordingly with respect to these types, there are other types, three or four makes of which have been approved by the engineering department, and which are, therefore, purchased by the purchasing department on a price basis. This feature is covered carefully in our requisitions.

When we purchase entirely new types of equipment or improved types of older equipment, we expect that the manufacturer will provide sufficient field supervision when the equipment is put in service to instruct our supervisors to handle it properly. To date we have been able to obtain all the service necessary to this end.

Four Important Factors Affect Purchases on D. & R.G.W.

By A. E. Perlman

Chief Engineer,
Denver & Rio Grande Western,
Denver, Colorado

ESSENTIALLY, the Rio Grande is equipped with off-track work equipment. It has very little on-track work equipment in regular service, except in yards where some modern Diesel-powered on-track clamshells are used by the stores department and for the handling of storage coal.

The annual expenditure for new work equipment each year is determined by, first, the amount and nature of the work budgeted for the ensuing year; second, whether or not the improvements made in certain equipment by manufacturers warrant expenditures for the replacement of obsolete types; third, the availability of new types of equipment which tend to reduce man-hours and at the same time accomplish the necessary work in an improved manner; and fourth, the availability of equipment to meet our specific needs.

Recommendations for new equipment are received from the division forces and others in charge of specific phases of maintenance and construction work. These recommendations

are gone over thoroughly and invariably prove highly valuable, but naturally a large number of them are dropped because of the system we have for programming work—a system which keeps the available machines, and those to be newly acquired, busy throughout the work season, even if such programming may cause some minor delays to programs on certain divisions. Oftentimes, recommendations are received for a specific piece of equipment from one source alone, when the amount of work at the particular location in question does not justify the purchase of the equipment. In such cases, an investigation is made throughout the system to determine whether sufficient similar work is needed at other points. If the investigation develops that there is enough work and economies are apparent to justify the additional investment, the equipment will be secured.

Obsolescence Not Overlooked

In view of the rapid developments in equipment, the replacement of existing units because of obsolescence is most difficult to program. For this reason it is necessary that we treat each type of equipment separately, insofar as requirements are concerned, from the standpoint of obsolescence. However, certain equipment is retired annually due to age, and this is determined by a detailed inspection of the equipment and the record of the repair costs, together with a forecast of expected expenditures for future repairs. From this information it is easy to determine whether or not replacements are necessary. For the most part, all of our equipment is repaired in one centralized shop, although we have a plan whereby our road mechanics do a considerable amount of preventive maintenance in the field, as well as actual needed repairs and adjustments.

In an effort to carry out this program, it is very desirable that units of equipment be standardized. This is particularly true as the number of similar units increases. Since our repairmen both in the shop and on the road must be thoroughly familiar with the equipment in their care, it is essential that standardization be carried out as far as practicable.

The manufacturers can be very helpful in instructing operators and shop and road repairmen concerning the various types of trouble which are likely to be encountered in the equipment they furnish, and also in giving demonstrations in the field and in the shop of the most efficient manner of making replacements and repairs.

Study Merits of All Makes—Seek Manufacturer's Cooperation

By Bernard Blum

Chief Engineer, Northern Pacific, St. Paul, Minn.

IN THE purchase of roadway machines and other units of work equipment, a number of factors must be considered, such as whether the equipment is for replacement purposes or as additions to present equipment, the extent of the program of work for the ensuing year for which it will be needed, and labor conditions. All of these factors tie in and must be considered in determining what shall be purchased. Other factors to be taken into consideration are the prospective deliveries of equipment which, in many cases, are still far from satisfactory; and whether the equipment has been established long enough and has been in use over a sufficient period of time—other factors being equal—to warrant purchases of the quantity needed.

In the purchase of tools and equipment ordinarily assigned to the divisions, the recommendations of the field and division forces are secured and are given careful consideration. Floating system equipment, such as that used in rail relaying and in power tamping of track, and a variety of other units, including power shovels and bulldozer outfits, is handled by the chief engineer's organization, and its selection and purchase are based on the results of studies carried on during the previous year, or longer, to determine where shortages exist; where obsolescence and shop repair costs to existing old equipment have reached the point where the equipment can be no longer economically maintained, and replacement is warranted; how certain makes and types of equipment are performing; and how a certain make compares with another of the same type.

Standardization, But—

Standardization is practiced to a considerable extent—in fact, to the fullest extent possible—since during the war years we had to protect ourselves with a large stock of repair parts which we shall maintain, and which, even with standardization, is complicated to an exceeding degree. However, we do not permit standardization to detract from the purchase of new equipment for test and subsequent adoption where found satisfactory, nor do we hesitate to change any given type whenever we are satisfied that something better is available.

When new equipment of an untried or unfamiliar nature is put in service we desire, and usually secure, help from the manufacturer's service organization. With some companies, such help is furnished on a sound, well-established basis, which we feel reacts directly to the benefit of the manufacturer, as well as to the purchaser. But in certain cases service or help from the manufacturer is sketchy or even non-existent, leaving the railroad to work out its problems as best it can. In some lines, manufacturers have branch agencies in the territory, but too often these have shown little concern for or interest in their equipment beyond their immediate horizon. Some manufacturers have recognized this and have a limited, highly-efficient floating railroad service organization. These we have found most satisfactory.

System Machinery Committee Important Factor on Pennsylvania

By S. R. Hursh

Assistant Chief Engineer-Maintenance, Pennsylvania, Philadelphia, Pa.

AT THE conclusion of each working season, each supervisor prepares a program of work that should be performed on his subdivision during the next working season and submits it to his division engineer for consideration. Having daily performance reports concerning various types of machines used in his territory in previous years, and a knowledge of other machines advertised, the supervisor can prepare his program indicating the equipment he requires. The program to be complete must indicate, in addition to the work to be done, the amounts of labor, materials, items of equipment and time that will be required to perform the work.

With recommendations of the indi-

vidual supervisors, division programs are then prepared covering track, bridges, buildings, telegraph and signals, which are combined into region and system programs. These, in turn, are used as the basis for determining the amount of equipment required to perform our work most efficiently and economically.

After work programs are approved, the assignment of available machines is made and the purchase of any additional machines necessary to carry out the programs is recommended to the management. Proposals for the purchase of new machines are supported by statements of the economies to be effected by their use.

Machinery Committee

Each region has one or more men who are charged with the assignment and upkeep of maintenance of way equipment, who also recommend what new equipment should be purchased both for additions to present equipment and as replacements of worn-out or obsolete machines. These men, together with the engineer of tests, maintenance of way, and a representative of the chief engineer, serve as a System M.W. Machinery committee, with the engineer of tests, maintenance of way, acting as chairman. To this committee are also added a division engineer and a track supervisor, who serve for periods of three months; these assignments being rotated around the system.

The committee meets monthly to consider questions concerning the operation, maintenance and improvement of existing machines and devices, the merits of new machines offered by manufacturers, the conduct of trials or tests of new machines, and suggestions for the development of new types of machines. One of its primary objectives is to seek the best tools and machines for particular purposes and the most effective means of using them. When similar machines serve equally well, allocation of the different types is made to the different territories on a type basis for ease of maintenance.

While it is evident that most manufacturers spend what they consider sufficient time and labor to develop their machines, the large majority are very receptive to suggestions as to alterations that can be made to their products to make them adaptable to conditions found on various roads or in different territories of the same road. Because of this attitude, it is felt that they are very much interested in the activities of our M. W. Machinery committee.

Each machine purchased and capitalized is subject to proper annual depreciation. This depreciation charge is included as an item in the maintenance budget. The accrued depreciation is made available for replacement of machines that are worn out or obsolete.

Machines, the cost of which is not included in capital account, are paid for out of operating expenses and are not included in depreciation accounts.

Maintenance Cost System a Factor in Purchases on C.&O.

By L. T. Nuckols

Chief Engineer, Chesapeake & Ohio, Richmond, Va.

BASICALLY, the preparation of our annual equipment-purchase budget is governed by the forecast of prospective revenue. As the funds that will be available for both improvement and maintenance programs are likewise determined by this forecast, a review of the equipment inventory, in the light of these programs, indicates the probable additional and replacement equipment units that will be feasible during the year. Unexpected requirements, arising from new projects originating during the year, are taken care of by including them in the new projects' authorizations.

It has been our custom for several years to request division and subdepartmental officers to submit recommendations as to the equipment to be purchased the following year. We not only correlate the recommendations of the field and division forces as to the number and types of units needed for their own use, but give consideration to the possibility of supplying these requirements by transfer of equipment from other divisions, or forces, for temporary or seasonal use. We find this to be a practical solution in many cases, for much of our equipment is not considered as permanently assigned to any particular division.

Keep Cost Records

A fundamental requirement of any piece of roadway equipment is that it produce a justifiable return on the investment. To substantiate any claims as to savings to be effected, definite figures as to performance, in comparison with other machines or methods, are necessary; otherwise the estimate is only a matter of opinion, which may or may not have a sound basis. Recognizing this, our railroad, for more than 20 years, has operated a maintenance cost system for analyzing and recording all track labor performance, both manual and with machines. The records kept include, in addition to operating charges, the costs of running repairs and overhaulage, as well as logs of service performance. With this information available, the selection of make, type and quantity of equipment desired is very much simplified. In cases of newly-devised machines or other equipment, the economies can only be estimated, but the possible extent of use is quite definitely known and considered as a factor in the purchase.

Only during the past few years has consideration been given to any specific depreciation accounting in the case of roadway maintenance equipment; nor can it be said that any formal method of overcoming depreciation of equipment as a whole has been undertaken. If any such practice has been in vogue during the past 15 years its effectiveness would have been nullified by the necessity of extending the service life of many machines, first as a result of the financial conditions that prevailed during the years of depression, and second, as a result of the emergencies caused by the war. At the present time any formal attempt to provide in the annual budget for future replacements would, of necessity, be arbitrary, for within the past few years a considerable number of new machines have been introduced, the life of which is a matter of conjecture.

It has been our practice for many years to discount obsolescence by distributing the purchases of any equipment of a given type over successive years, thus taking advantage of new developments and improvements as they take place. This also obviates the embarrassment of having to postpone the replacement, in quantity, of worn-out equipment in years of financial shortage. It has also been our practice, insofar as possible, to provide for the automatic amortization of equipment when the purchase is made. By including a straight-line depreciation charge per year for the probable life of the item, the annual estimated saving is reduced and the result reflected in the lower return on the investment.

From several standpoints we view

(Continued on page 281)

On the Illinois Central System many of the problems of repairing maintenance of way work equipment have been largely overcome by concentrating repair activities on the division level, in well-equipped shops, while at the same time coordinating these activities on a regional and a system basis. This article describes the organization of the road in this respect, and gives a detailed description of three of the more important work equipment repair shops.

Keeping Work Equipment W

PLACING the responsibility of maintaining and repairing maintenance of way work equipment at the division level and providing the division forces with adequate facilities for such work is the underlying principle in the Illinois Central's plan to secure the maximum performance from its equipment. For this reason, in developing the system now employed on this road for maintaining and repairing its motor cars and power machines, emphasis was placed on the creation of a trained corps of mechanics on each division and on the establishment of division repair shops, fully equipped to make repairs on the largest types of work equipment.

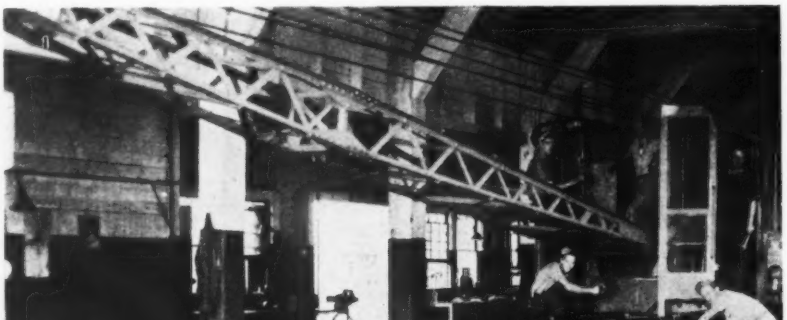
Maintenance officers on the Illinois Central have long recognized that a high degree of mechanization is essential to the economic and efficient maintenance of the tracks and structures and, as a result, a wide variety of machines has come into use on this road. At the same time it was early recognized that the most effective use of this equipment could be obtained only under a systematic plan of inspection and repair, and that, with the exception of such machines as locomotive cranes, pile drivers, dump cars and similar equipment coming under Master Car Builder and Interstate Commerce Commission rules and regulations, this equipment could best be maintained, repaired and overhauled under the jurisdiction of the maintenance of way department.

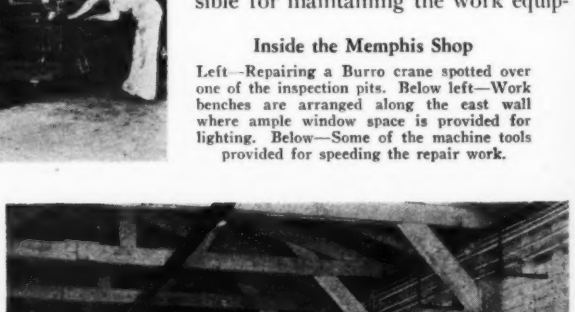
Organization

The Illinois Central comprises more than 6,000 miles of line and extends from its northern terminal at Chicago to New Orleans, La., with secondary lines serving such points as Indianapolis, Ind., St. Louis, Mo., Louisville, Ky., Birmingham, Ala., and Shreveport, La. Another important line extends from Chicago to Sioux Falls, S. D., Sioux City, Iowa, and Council Bluffs, Iowa. For operating purposes the road is divided into two regional territories, that part of the system lying north of the Ohio river being known as Northern lines, and the remainder, south of the Ohio, Southern lines.

A supervisor of maintenance of way equipment is assigned to each of these regions and is responsible for the coordination of all work-equipment repairs in his territory. These officers report directly to a superintendent of maintenance of way equipment of the system, who is a member of the staff of the chief engineer.

Each division engineer is responsible for maintaining the work equip-

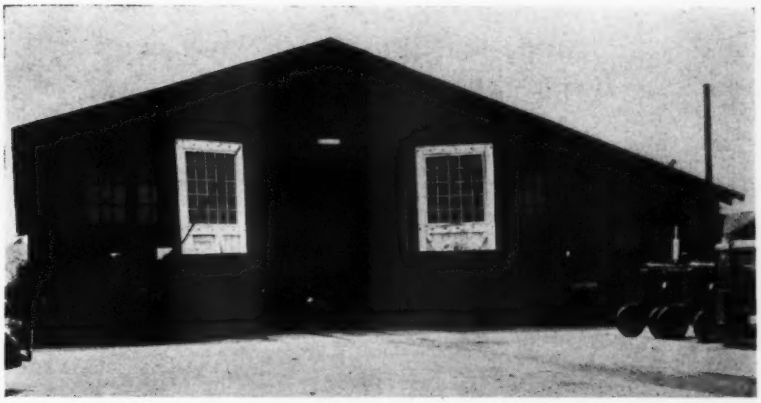




Inside the Memphis Shop

Left—Repairing a Burro crane spotted over one of the inspection pits. Below left—Work benches are arranged along the east wall where ample window space is provided for lighting. Below—Some of the machine tools provided for speeding the repair work.

Working on the I. C.



Above—View of the Exterior of the Memphis Shop

Right—A Hand-Operated Transfer Table at Memphis Serves the Storage Sheds and the Main Shop Building

ment assigned to his division and is assisted and advised in this respect by the proper supervisor of maintenance of way equipment. In general, an equipment repair shop is located on each division. The operating divisions included in the Northern lines are the Chicago Terminal, the Springfield, the Illinois, the St. Louis, and the Iowa, and the equipment repair shops for these divisions are located at 26th Street, Chicago, Clinton, Ill., Champaign, Ill., Carbondale, Ill., and Waterloo, Iowa, respectively. On the Southern lines, the shops are located at Paducah, Ky., for the Kentucky division; Memphis, Tenn., for the Memphis division; Granada, Miss., for the Mississippi division; Macomb, Miss., for the Louisiana division; and Vicksburg, Miss., for the Vicksburg division. The shop at Memphis also cares for the equipment of the Memphis Terminal division.

In addition to functioning as division shops, the shops at Chicago, Memphis, and Waterloo have been designated as repair points for "whole-line" or system, equipment. Such equipment includes essentially the machinery used in rail-laying organizations and other units used on a system-wide basis. After repairs to this system equipment, which are usually made late in the fall and during the winter, it is stored at the repair shops until the next working season. The road's rail flaw detector cars are also maintained and repaired at these three shops.

Inspection

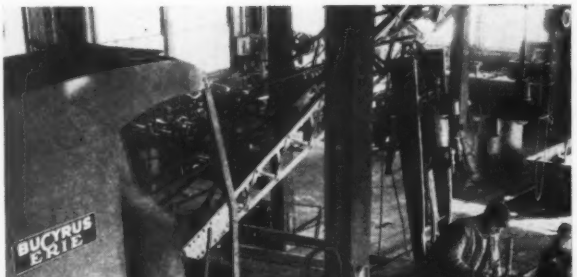
To minimize complete breakdowns, the Illinois Central early inaugurated a system of educating its operators in the proper methods of inspecting and lubricating motor cars and equipment. These men are also trained to make running repairs in the field whenever possible. However, recognizing that many of the operators may overlook some important point of inspection, a more thorough check of the equipment is made periodically on each division, usually by the foreman of the division repair shop or by the lead mechanic. Records of such inspections are maintained at each shop and division office to insure that no item of equipment is overlooked.

A general inspection of all equipment is made at the close of the working season. Light repairs to equipment are often made at outlying points, the necessary parts being furnished from the division shops. After repairs, the equipment that is used only during the working season is stored for the winter at these points. Units found to require heavy repairs for overhauling are shipped to the proper division shops and, after repairs, are either stored at the shop or returned to service. Many of the smaller units, such as electric tie-tamping outfits, are sent to the division shops for repair and storage at the close of the working season.

The Memphis Shop

The shop at Memphis, which, as already pointed out, serves as the division repair shop for both the Memphis and Memphis Terminal divisions and as the heavy repair point for whole-line equipment on the Southern lines, is located at the south end of South yard, Memphis. This shop consists essentially of a main building and two storage sheds. The main building is of frame construction with a concrete floor and is 54 ft. by 140 ft. This building lies in a north-south direction and is served by two tracks, one of which, known as No. 1, enters the shop from the north from a direct connection with the main line, and extends through the shop to a small transfer table beyond. The second track, No. 2, enters the building at the south end from the transfer table and extends into the structure for a distance of 40 ft. A runaround track, connecting track No. 1 with the yard lead south of the shop area, extends around the west side of the shop.

The shelter sheds, of frame construction, each 25 ft. by 95 ft. in plan, lie in an east-west direction, and are parallel with each other. One of these, known as the north shed, adjoins the south end of the main shop building, extending to the west to form an L. The south shed is approximately 25 ft. directly south of the north shed. The pit for the transfer table is between the storage sheds and extends across the south end of the main shop building. The table is 12 ft. long and is hand operated. In addition to serving the shop building and storage sheds,



At Waterloo

Above left—A dragline and a crawler tractor undergoing repairs. Above—Like the other shops, this one is well equipped with machine tools. Left—View of the storage sheds showing the main shop in the background

it also serves four storage tracks, each 50 ft. in length, located directly south of the shop.

The interior of the main building is largely an open floor except for two rooms, each 14 ft. by 20 ft., in the northwest corner, and an office, 10 ft. square, in the northeast corner. One of the rooms in the northwest corner is for the storage of parts and tools, while the second of these rooms affords washroom, toilet and locker facilities. The remainder of the building is given over to repair work.

In the arrangement of the working area, machine tools and work benches are located along each wall, providing a generous amount of open space in the center of the building. The repair tracks are located near the center of this area and each is provided with an inspection pit—that for Track 1 being 20 ft. in length, and that for No. 2 30 ft. long. A 1½-ton, electric overhead crane, with a 130-ft. runway and a 30-ft. span, extends above both tracks.

Among the considerable amount of shop tools and machines to facilitate and speed up repair operations are a 36-in. bench lathe, an 18-in. lathe with an 8-ft. bed, and a 42-in. lathe with a 14-ft. bed. Other units include a milling machine, a 14-in. power hack saw, a 100-ton portable hydraulic press, a 50-ton stationary hydraulic press, a 50-ton electric hammer, an 18-in. electric floor grinder, a 36-in. radial drill and an 18-in. floor drill. In addition there are a number of smaller items, including compressors, welding equipment, a Vogle metalizer, and wheel-pulling equipment.

Typical Division Shops

More typical of the division shops are those at Waterloo, on the Iowa division, and at Clinton, on the Springfield division, both on the Northern lines, although, as already pointed out, the shop at Waterloo is also used to some extent for the repair of whole-line machinery located in its territory. Each of these embodies a central shop building, well equipped with machine tools and other facilities, and adjacent sheds for the storage of equipment.

The main shop facility at Waterloo is located in a one-story frame structure, 40 ft. by 66 ft., close to the east end of Waterloo yard, convenient to the main track. It lies in a generally east-west direction and is served by a repair track which enters the shop at the east end and extends through it and beyond into a building 50 ft. to the west, used as a paint and carpenter shop. Flanking this track to the east of the main shop are two storage sheds, each 80 ft. long by 15 ft. deep, also of frame construction. All of these structures have concrete floors. A second track, serving a loading platform and ramp, is located north of the shop buildings and the storage sheds.

The interior of the main shop is arranged to provide a 40-ft. by 52-ft. work room, which occupies the east part of the building, while a 10-ft. by 13-ft. office, and a stock room of similar size, are located across the west end. Small storerooms above each of these rooms on the main floor are given over to the winter storage of electric tie-tampers and other small units. Large double doors at both ends of the main shop, and at the east end of the paint shop permit the entry of the largest units of track-mounted or off-track equipment. Steam heat is provided from a boiler located in an adjacent building.

Mechanical repair work is done primarily in that part of the main shop lying to the south of the repair track, an area approximately 16 ft. by 52 ft., which is equipped with work benches and tool racks arranged along its south wall. Inspection and repair of the running gear and under sides of motor cars and other track-mounted units is done on the repair track, which, for this purpose, is equipped with an inspection pit 16 ft. long, located near the east end of the room.

Machine Tools

The north half of the main shop area is given over largely to machine tools and for the repair of parts. These tools include two bench lathes; an 8-in. Atlas shaper; two drill presses; one bench grinder; a 40-ton portable, hydraulic press; a Cincinnati milling machine; a combination brake-lining machine and grinder; and a

Black & Decker valve set. Other equipment at the shop includes a boring set, a 60-cu. ft. air compressor, a parts washing machine, and oxy-acetylene and electric welding outfits.

As already mentioned, equipment storage sheds are located on each side of the repair track east of the shop. These sheds are parallel with and 10 ft. from the center line of the track, and the 20-ft. space between the sheds, including the track, is paved with concrete. Each shed is divided into ten stalls, each stall being entered through a sliding door.

The Clinton Shop

The shop at Clinton, serving the Springfield division, is one of the newest on the Illinois Central. Like the other shops described, it is a frame structure, so located as to provide immediate access to the main track, and has a pair of equipment storage sheds. Like the Waterloo shop, it is served by a track which first passes between the storage sheds and then extends through the repair shop proper to a carpenter and paint shop beyond. Also like the Waterloo shop, it has a loading platform and ramp at a nearby track. The main building is 36 ft. by 70 ft. in plan and its interior arrangement is similar to that of the shop at Waterloo—an office and a storeroom being located across one end while the remainder is used for equipment repair activities.

The shop differs from the Waterloo shop in that its construction, without the use of intermediate columns, affords an unbroken workroom which provides greater latitude in maneuvering units of equipment. Another feature of the Clinton shop is the provision of a special cabinet mounted on the wall above each work bench, each cabinet containing a complete set of hand tools.

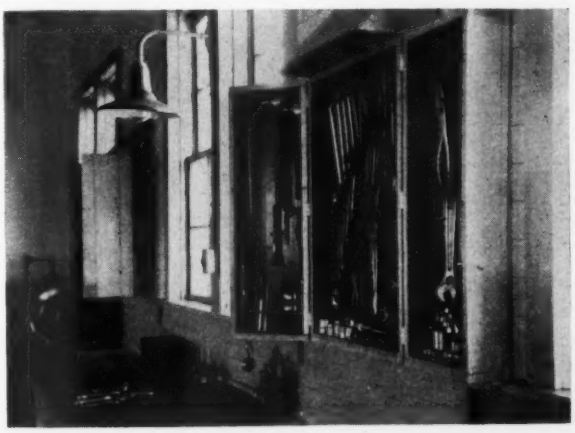
The storage sheds at Clinton are 18 ft. by 81 ft., and are divided into stalls, each entered through sliding doors. A concrete apron 20 ft. wide extends across the area between the sheds and continues along the track to the main shop.

The tools provided at the shop includes a bench lathe, a milling machine, a power saw, a drill press, a 14-in. grinder, a 24-in. floor lathe, a 40-ton stationary hydraulic press, electric and acteylene welding outfits and a parts washing machine.

An interesting piece of equipment recently introduced at each of the repair shops, except one, is a portable high-pressure, steam-cleaning outfit for use in removing accumulations of dirt and grease from work equipment. These units embody an oil burner for generating steam and are capable of producing steam at 120-lb. pressure in less than two minutes. A cleaning solution is introduced directly into the steam flow, in amounts varying with the nature and quantity of the material to be removed. These units can also be used to remove paint.

The Illinois Central's system for maintaining and repairing its work equipment is proving highly advantageous from several standpoints, especially under present-day conditions, which require that its equipment be used more intensively than ever before. The emphasis placed on making light repairs in the field, wherever possible, coupled with the systematic periodic inspection, insures that lost time due to breakdowns and shopping—and consequent disruption of work programs—is reduced to a minimum. Also, the method of giving the division engineer control of the repair and overhaul of his machinery—with the advice of the supervisor of work equipment—insures the rapid, yet, at the same time, thorough repair of the equipment when at the shop. A third advantage, and by no means the least important, is that the repair of maintenance of way equipment is planned, controlled and performed by the department which has the greatest interest in it.

All work equipment maintenance and repair on the Illinois Central is carried out under the general direction of C. H. Mottier, vice-president and chief engineer, and C. M. Chumley, engineer maintenance of way. However, general supervision is by R. E. Buss, superintendent of maintenance of way equipment (system), at Chicago, and by R. E. Bergren, supervisor of maintenance of way equipment (Northern lines), Chicago, and L. L. White, supervisor of maintenance of way equipment (Southern Lines), at Memphis, Tenn.



The Clinton Shop

Right—One of the special tool cabinets located on the wall at each work bench. Below—Showing the arrangement of the work benches and tool cabinets. Below Right—Some of the machine tools, and a mower awaiting overhauling.

What Is An Effective Organization for

In this machine age in railway maintenance work the efficient functioning of any maintenance department is dependent to a large extent on the condition of the equipment assigned to it, and this, in turn, will be determined by the nature and effectiveness of the organization in which responsibility has been placed for keeping the machines in good working order. In this article, which was presented originally as a paper before a meeting of the Maintenance of Way Club of Chicago on February 24, Mr. Westcott discusses in detail an equipment-maintenance set-up based on a divisional organization for property maintenance, giving particular attention to the responsibilities of individual officers and employees.

By G. R. WESTCOTT
Assistant Engineer, Missouri Pacific Lines
St. Louis, Mo.

FOR THE past ten years, the Railway Age has estimated, from reports secured from all but two of the larger railroads of the United States and Canada, the yearly expenditures of these roads for mechanical tools and equipment used by the construction and maintenance of way and structures forces. These figures show, for the ten-year period, an expenditure in excess of $100,000,000. This is, to be sure, not a large sum in comparison with the cost of locomotives, cars and other revenue-producing facilities; nor in comparison with the cost of materials used for the maintenance of the property, yet it is a considerable amount of money.

The equipment purchased with it is not revenue producing in itself. The expenditure can be justified only if we can do with it, at less cost than could be done otherwise, those things that must be done in order that our revenue-producing equipment can function.

The planning of the work on which any machine is used may have a large effect on the return secured from the investment in it. But even though the work is well planned, the return may not be realized because of the inefficient maintenance of the machine. Or, if the work is indifferently or poorly planned, the return may stand or fall depending on whether or not our maintenance of the machine has been efficient.

The change from hand labor to machine operation has been gradual. How rapidly it would come, and to what extent it would continue could not be foreseen. Many roads, therefore, have found themselves with a considerable amount of equipment on hand, with no studied plan for caring for it. They are, perhaps, still handling the maintenance of the equipment with the same force—somewhat enlarged, to be sure, but with no special concern as to fitness—that they had when the only equipment used were the motor cars, a few concrete mixers, and perhaps some on-track work equipment. Other roads, realizing that successful maintenance of the equipment could only be secured through a suitable organization, have studied the conditions on their property and have established an organization best suited to meet those conditions.

"The repair of a machine when it has become unserviceable is often necessary, but such work is corrective only. If our picture of equipment maintenance shows only that, we have not studied it well. Let us search the background to discover, if we can, why the repairs are necessary. Perhaps we may find that, if preventive measures had been applied, the corrective work would not have been required, and the delay to the machine while this work was being done would have been avoided."

The Divisional Set-Up

In general, the organization for maintaining work equipment should run parallel with that for maintaining the property. The outline I am giving here is that suitable for a road maintaining its property under divisional control. The titles used, of course, will vary between roads as will also the designations of the separate units making up the complete organization. In this discussion the system officer in charge of maintaining the property is the chief engineer of maintenance, and the officer in charge of equipment maintenance is the superintendent of work equipment. Following these in order are: For the districts or grand divisions, the district engineers for the property, and the supervisors of work equipment for the equipment. For the divisions, the division engineers for the property and the division maintainers for the equipment. And finally, for the subdivisions, the roadmasters (or other supervisors) for the property, and the field maintainers for the equipment. In each rank the man in charge of maintaining the equipment will report to the corresponding officer in charge of maintaining the property in matters pertaining to the work being done, and to his next superior maintenance officer in connection with the maintenance of the equipment.

The outline given, particularly as related to the maintenance of work equipment, may not be applicable on many railroads. Each road has its own problems, involving not only the type of organization supervising the maintenance of the property, but also the extent to which the work is mechanized, what agreements with labor organizations may require, and other considerations. Unless the organization accomplishes two things it is not functioning efficiently. These are, briefly: (1) It must prevent any machine from being out of service for long periods because of its condition;

for Equipment Maintenance?

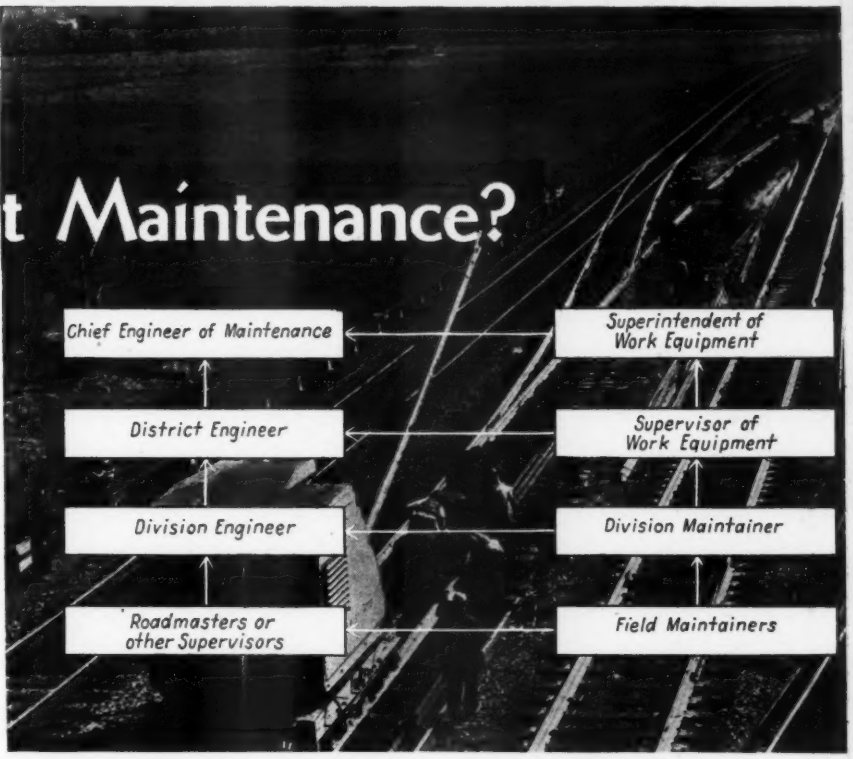


Diagram of the Work Equipment Organization Described by Mr. Westcott

and (2) it must prevent frequent interruptions in the operation of the machine due to its condition.

I assume that those whom I am addressing are largely men concerned with the maintenance of tracks, bridges, buildings and other property rather than those chosen to maintain machines. Let me ask then: "What is the picture that comes to your mind when you think of machine maintenance?" Probably it is one of a mechanic making repairs, or of a machine being overhauled in a shop. Let me suggest it is much more than that.

Preventive "Medicine"

Our friends of the medical profession sometimes refer to their medication as "preventive" when the health of the patient is good and the aim is to keep it so, and "corrective" where disease has already established itself and must be eradicated or remedied. We may well borrow these terms in discussing the maintenance of equipment.

The repair of a machine when it has become unserviceable is often necessary, but such work is corrective only. If our picture of equipment maintenance shows only that, we have not studied it well. Let us search the background to discover, if we can, why the repairs are necessary. Perhaps we may find that if preventive measures had been applied, the corrective work would not have been required, and the delay to the machine while this work was being done would have been avoided.

The timely tightening of bolts and the making of adjustments are corrective. They are also preventive, since a loose or missing bolt, or an improper adjustment, if not corrected promptly, frequently results in a broken part or in inefficient operation.

Other Precautions

Reasonable treatment in operation is preventive. The racing of an engine or unskillful handling of a clutch may often lead to a machine failure. The use of suitable lubricants and care in applying them are preventive: improper lubrication is responsible for many machine failures and much time out of service. Protecting the machine from the weather, from corrosion, and from pilferage, especially during periods of idleness, and keeping it clean during use, are preventive. Respecting the capacity or limitations of the machine, avoiding overloading or excessive speed, and using care in moving it to or from the track, or over rough ground, are all preventive measures.

Foreseeing the need for repair parts and arranging to have them on hand when needed is preventive. "Waiting for repairs," especially in recent months, has been one of the most common reasons given for a machine being out of service.

What About Repair Parts?

When, through failure to recognize the importance of preventive measures, or through accident, a machine is out of service, repair parts ordinarily will be required. Let us assume that the need for them could not have been foreseen and that the parts required are not on hand. The length of time the machine is out of service may be shorter or longer depending on a number of things.

First—Has the operator been provided with a parts list, and has he been trained to indicate promptly to the proper officer exactly what parts are required? Or, if the operator cannot furnish that information, is the maintainer prepared to do so? And does the officer to whom the information is given know how to proceed to secure the needed parts with the least delay? If the answer to these questions is "no," we are not maintaining our machines with the maximum efficiency.

Second—Are the required parts at the company store? Much is involved here. It is obvious that all parts for all machines cannot be carried in stock. Where there are but one or two machines of a kind on the property, it is evident that only those parts most likely to need renewal will be stocked. It may be pointed out, however, that having a part listed in the stock book does not make for economical maintenance unless it is actually in stock. Keeping the "stock balance" down is desirable, but the expense of carrying a stock of parts may often be overshadowed by the loss of the service of a machine.

Third—Let us suppose that the parts are not in store stock. It is then doubly important that exact information as to what is needed be given to the proper officer. Since the order, in this case, must go to a manufacturer or his representative, it is essential that the machine be fully identified as to make, type and serial number, and that the exact symbol numbers and descriptions of the parts be shown.

Fourth—What is the attitude of the management toward the purchase of parts locally? In some cases purchases from local dealers are subject to the same discounts as are secured from the manufacturer. Often they are not. Hence, the railroad may face the loss of a discount on the one hand, or a much greater loss in the time the machine is out of service, as well as in the time lost by the gang with which the machine works, on the other. Local purchases should be the exception, but should be permitted when necessary if our maintenance is to be efficient and effective.

Placing the Responsibility

In order that we may see how responsibility may or may not rest on the men constituting the force specifically charged with the maintenance of the equipment, let us briefly examine the duties of each. At the bottom of

the list is the field maintainer. His work is largely corrective as he is the man who is called upon to make field repairs, which, from lack of tools or experience on the part of the operator, cannot be made by him. The maintainer's activities should also be preventive. The more attention he can give to inspections and adjustments, and the more he can accomplish in the training of the operators, the less frequently he will be called upon for corrective work.

The division maintainer is assumed to have had greater experience than the field maintainer, and, if provided with a shop, will be able to carry out corrective work beyond the capacity of the field maintainer. Training others should be one of his functions; and his field for the exercise of this function will include the field maintainers, the operators of the machines, the gang foremen, and the roadmasters and other supervisory officers that he may contact.

The duties of the supervisor of work equipment are varied. He must know in detail the machines on his territory, but to know the men maintaining and operating them is quite as important. As in any supervisory work, his ability to secure the cooperation of those with whom he deals will have a marked influence on his success. Securing cooperation goes hand in hand with training. A man who understands why a certain thing should be done is much more likely to do it than if he had simply been told to do it. Whatever authority may be given the supervisor of work equipment over those not engaged directly in the care and maintenance of the equipment, he may often find it expedient to bring about a desired end by working through a roundabout way.

Take the case of a gang foreman who persists in changing the governor setting on his tamper engine contrary to the advice of the maintainers. Perhaps he still persists after being told by the supervisor of work equipment why this should not be done. This foreman may question the authority of the supervisor but will respect that of his roadmaster. If the supervisor, then, will handle the matter with the district engineer, he in turn with the division engineer, he with the roadmaster, and finally the roadmaster with the foreman, the trouble is likely to be corrected with no antagonisms set up. And all concerned have received a lesson in handling that particular piece of equipment.

Selecting Machines

The superintendent of work equipment will represent the chief engineer of maintenance in all matters pertaining to the selection, use and maintenance of roadway equipment. He will be especially concerned in the selection of new machines. To those who deal most directly with the maintenance of equipment it is well known that certain makes of machines require less maintenance than others, and that some manufacturers are more alive than others to their responsibility in furnishing parts and service promptly.

It is also obvious that restricting purchases to a single make when a fleet of machines is bought has many advantages. With more parts interchangeable there will be less time lost waiting for parts that may be needed suddenly; maintainers will require less time in making repairs; and operators, who from time to time may change from one machine to another, will become more expert in handling them. The superintendent of work equipment will give these things weight in recommending what shall be purchased, remembering, however, that these principles should not be put into practice until it has been determined that the make chosen is best suited for the work to be done.

What has been said to this point has dealt largely with the activities of the men in our typical machine-maintenance organization. Let us not be misled into thinking that efficient maintenance rests on these men alone. They are, to be sure, the key men. If the maintenance is successful, they should be commended. If it is not, they will surely be blamed, and often wrongfully.

Many of the older men engaged in maintaining the property, from gang foremen up through the organization, were trained in the days of hand labor. By some of these men the machines will be welcomed, well cared for, and fairly treated. By others, they will be treated with indifference or worse. Even among those who see the advantages of a machine there are many who fail to realize that its successful use requires attention to details previously unknown, many of which center around the care of the machine and are of vital importance in the maintenance of it. Let us examine a few cases where the failure to secure good maintenance rests, not with the men directly charged with that responsibiilty, but with others who have failed to realize that they, too, have a responsibility.

Fundamentally, the operator of a machine cannot be classed as a maintenance man. His duties are primarily concerned with the work the machine is doing. Being always with the machine, however, his attitude toward its maintenance is most important. There are a multitude of ways in which he can aid in keeping the machine in successful and continuous service, and just as many ways in which he can fail. Many of these are covered by rules: keeping bolts tight, keeping the machine clean, attention to careful and regular lubrication, avoiding rough treatment of any kind, protecting against freezing in winter, etc. These are all preventive measures, and failure to observe them will, sooner or later, call for the application of correctives.

Let me illustrate: Here is a gang foreman who has persisted in overloading his motor car, or has habitually violated the established speed limits. Entirely apart from the safety features involved, his habits do not promote good maintenance. The damage to the car may not be apparent at once; but consistent violations of good practice in this respect will eventually shorten the life of the car or hasten the need for corrective maintenance.

Then, here is a roadmaster who, over the protests of the operator and the division maintainer, has insisted that a bulldozer be moved under its own power a distance of some twenty miles, and returned, to do less than one day's work. We may disregard the time required to make the move; it would perhaps have been equalled or exceeded by the time required for loading and shipping the machine. Nor are we concerned here with the poor planning that made the move necessary. But we must note that the unnecessary strain and wear on the machine from running over hard and rough ground for that distance will be reflected in the cost of maintaining it. The roadmaster gave no thought to that. His conception of

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maintenance if, indeed, he had any, was the picture to which I have previously referred—that of a mechanic and a wrench.

What is the division engineer's picture of maintaining equipment? Has he failed to look behind the bare outlines of a mechanic and his tools? Does he condone the actions of the roadmasters that I have described? Perhaps not. Possibly in each case, if he had been on the ground, he would have countermanded the roadmaster's orders. But does he appreciate the fundamental needs in maintaining a machine, and does he see that those under him are given the same viewpoint? Unfortunately, he often does not.

The district engineer has a supervisor of work equipment to advise him on the needs of the machines and is in a position, through the division engineer, to impress these needs on the entire organization, down to the lowliest laborer. If he fails in doing this, he is contributing to unsuccessful maintenance of the equipment.

In remote cases, the chief engineer maintenance may be involved in determining whether or not the machines are maintained successfully. His selection of the superintendent of work equipment, and his full support of the efforts of that officer are extremely important.

Can't Stop Here

We have considered the responsibilities of those specifically charged with the maintenance of our equipment, and have indicated how those engaged in the maintenance of the property may also play a large part in this effort. We must not stop here. It may not have occurred to some that there are still others whose activities have an indirect but scarcely less important influence on our efforts to maintain equipment successfully.

Let us interview the storekeeper. We may inquire of him: "Do you have in stock those parts which have been set up in the stock book as necessary for corrective maintenance of our machines? Do you see that these parts are shipped out promptly and correctly when ordered? Do you promote preventive maintenance by seeing to it that the lubricants furnished are as ordered, and that they are issued in clean containers? Do you require that condensed water be drawn off from gasoline storage tanks at frequent intervals, that the proper oil is used in making the stock mixture of gasoline and oil for two-cycle engines, and that the drums in which this mixture is issued are clean and dry before filling?" If the answer to these questions, and many others that might be asked, is "yes" in every case, the storekeeper is contributing much to successful maintenance. But if it is "no" he is failing in his responsibility toward efficient maintenance.

I have mentioned the advantages of making local purchases of parts in certain cases, and also the wisdom of keeping the ease of maintenance in view in the selection of our machines. There are still other ways in which our practice in the purchase of materials may vitally affect our efforts to secure efficient maintenance.

"Some years ago you may have seen in a Ford agency a sign reading: 'Genuine parts are better than substitute parts; if you don't believe it, ask the man with a wooden leg.' In the purchase of some small parts, a lower price can sometimes be secured from a manufacturer of the part than from the maker of the machine or engine. Such purchases are based on the theory that 'a penny saved is a penny earned'—a good theory when carefully applied. Too often, the penny saved is not a penny earned; instead, it may result in hours lost to the machine, man-hours lost to a gang, and dollars spent in labor."

No "Wooden Legs"

Some years ago you may have seen in a Ford agency a sign reading: "Genuine parts are better than substitute parts; if you don't believe it, ask the man with a wooden leg." In the purchase of some small parts, a lower price can sometimes be secured from a manufacturer of the part than from the maker of the machine or engine. Such purchases are based on the theory that "a penny saved is a penny earned"—a good theory when carefully applied. Too often, the penny saved is not a penny earned; instead, it may result in hours lost to the machine, man-hours lost to a gang, and dollars spent in labor.

There is another side to the question of buying substitute parts. The maker of the machine, to meet competition, may not always use the best parts available; sometimes such parts as piston rings of special design or material, or clutch linings of special material, have been found to give much better service than those with which the machine was originally equipped. Such parts usually cost more than like parts furnished by the maker of the machine.

The point I wish to make is that, within reasonable limits, the service secured from the parts, rather than their first cost, is of first importance. If the purchasing agent realizes this and buys on the recommendation of the superintendent of work equipment rather than on price alone, he will do much to promote efficient maintenance. This principle is especially true in the purchase of lubricants. The oil business is highly competitive and, when the selection is based largely on price, the quality is likely to suffer. Too, except in the remote case of a complete lubrication failure, it is difficult to reduce to dollars and cents the damage that may be done by the use of poor lubricants.

Management's Responsibility

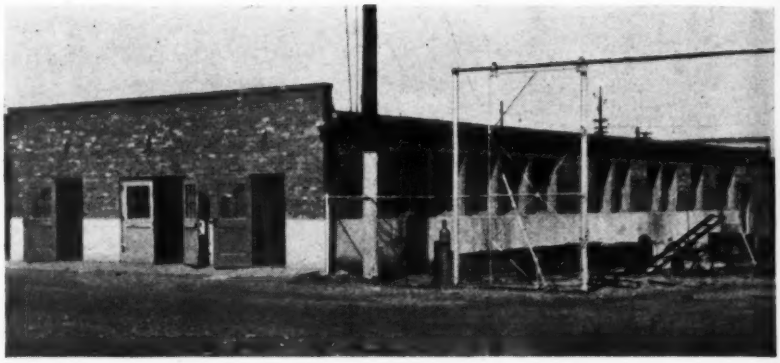
We may be accused of "lese majesty" if we pay our respects here to the management. Yet, the record is incomplete unless we do. Let us assume that an organization for maintaining our equipment has been set up, and that it is so adapted to the organization maintaining the property that the two can work well together. Yet, we may still ask: "Is our organization sufficiently manned?" If the amount of work to be done is such that the field maintainer's time must be spent on corrective work rather than preventive measures and in the training of operators, the field force is insufficient. Likewise, if the territory of the supervisor of work equipment is so large that he cannot make frequent contacts with both the maintainers and the men engaged in the maintenance of the property, he will not be able to build up the cooperation upon which successful maintenance depends.

Again we may inquire: "Is our maintenance force adequately equipped?" Whether the policy laid down contemplates much or little repair work being done in division shops, the work cannot be done efficiently unless proper equipment is provided. Elaborate shop facilities generally need not be provided; but the needs in each case must be considered, and facilities provided accordingly. In the past the maintainers on a majority of the roads have traveled by motor car. The use of a small automobile truck will in many cases get these men to their work more quickly and give greater assurance

(*Continued on page 292*)

The Denver & Rio Grande Western has started on a plan which calls for providing a modern, well-equipped bridge, building and water service shop at each of its four division points and for the motorizing of the forces at these points. This article tells something of this plan and describes the first of the shops to be built at Pueblo, Colo.

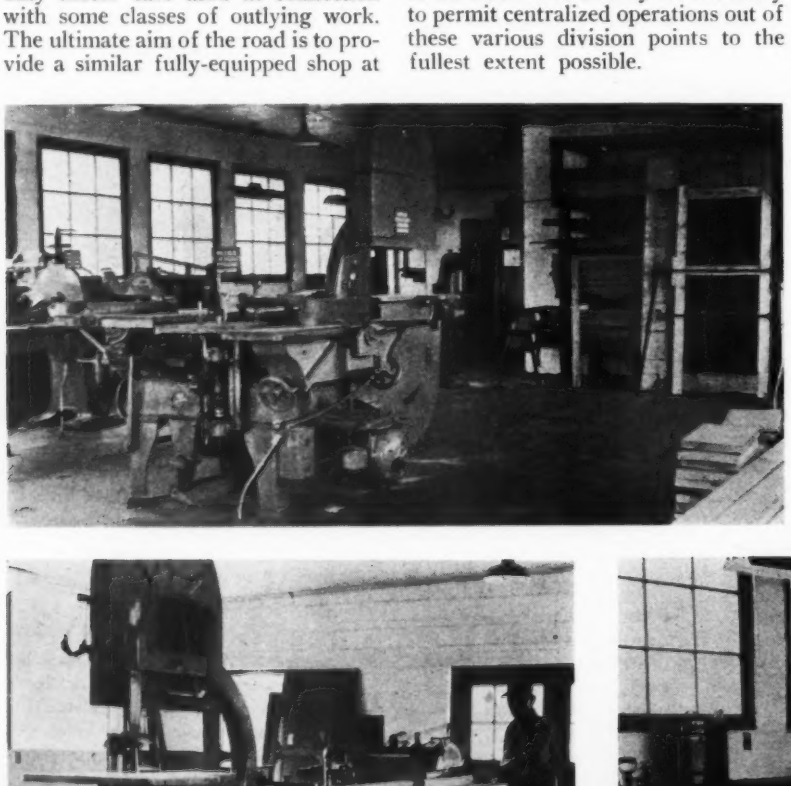
Bridge, Building and Water Servi



General View of the New Shop at Pueblo, Colo.

THE Denver & Rio Grande Western is going all-out to mechanize and motorize its bridge, building and water service forces, and has already taken several important steps to that end with the construction of a new, full-equipped bridge, building and water service shop at Pueblo, Colo., and the purchase of a total of 12 motor trucks, for these forces, to supplement heavy-duty motor cars used in connection with some classes of outlying work. The ultimate aim of the road is to provide a similar fully-equipped shop at each of its other three division points —Denver and Grand Junction, Colo., and Salt Lake City, Utah—and to add to its truck fleet as may be necessary to permit centralized operations out of these various division points to the fullest extent possible.

Under this plan, which will embrace the Denver & Salt Lake (to be consolidated with the Rio Grande under the plan of reorganization soon to be effective), the principal bridge, building and water service crews on the road will be located at the division points, each with a modern shop, equipped with power wood-working and other tools, and will move out over the various lines of the respective divisions, via the highway, through a radius of as much as 50 miles. Under present arrangements, except at Pueblo, the principal bridge, building and water service crews have headquarters in a variety of buildings equipped with few power-operated shop tools, and thus are required to do



Left—General Interior View of the Bridge and Building Shop. Below Left —Sizing a Piece On the Circle Saw End of the Universal Woodworker. Below —Work Benches Are Located Along the Side Walls Where Maximum Daylighting Is Afforded for Their Use

Service Crews on the D. & R.G.W.

Are Mechanized and Motorized

most framing and general repair work in the field. Furthermore, to the extent that these gangs are not yet adequately equipped with motor trucks, they are restricted in their movements about terminals, and also in the distance they can travel away from terminals, except by train, and local train service on most of the lines of the road is not favorable to their most convenient and economical operations.

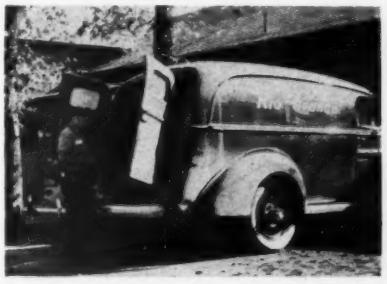
Permits Prefabrication

Under the new arrangement also, prefabrication to the fullest extent possible will be the rule of the road, and field work, to the maximum extent, will be confined to installation or erection. Thus, for building work, such parts as doors and door frames, window sash and frames, and signs of all kinds, will be machine-made in the various shops. Likewise, many bridge timbers will be shop cut and framed, bridge ties will be dapped, and a wide range of repairs will be made to water service equipment. Materials will be trucked to the points of use, along with the necessary force, and installed, and the trucks then used to return the crews, tools and any salvage.

In addition, the power equipment at the various shops will be used to recondition such bridge, building and water service materials as are reclaimable, looking to their reuse, a feature which has already proved of value in the one new shop in operation, especially with respect to many items that have been difficult to obtain.

All of this will not preclude the continued employment of some bridge and building work trains and camp outfits, which will continue to be necessary for sizeable field operations, nor will it interfere with the continued use of a considerable number of track motor cars and trailers by the bridge and building forces, especially in conjunction with the camp outfit crews. It is expected, however, to increase the radius of operations of the principal gangs, reduce their travel time, speed their field operations, and make it possible for a larger number of men to live at home at the various division headquarters.

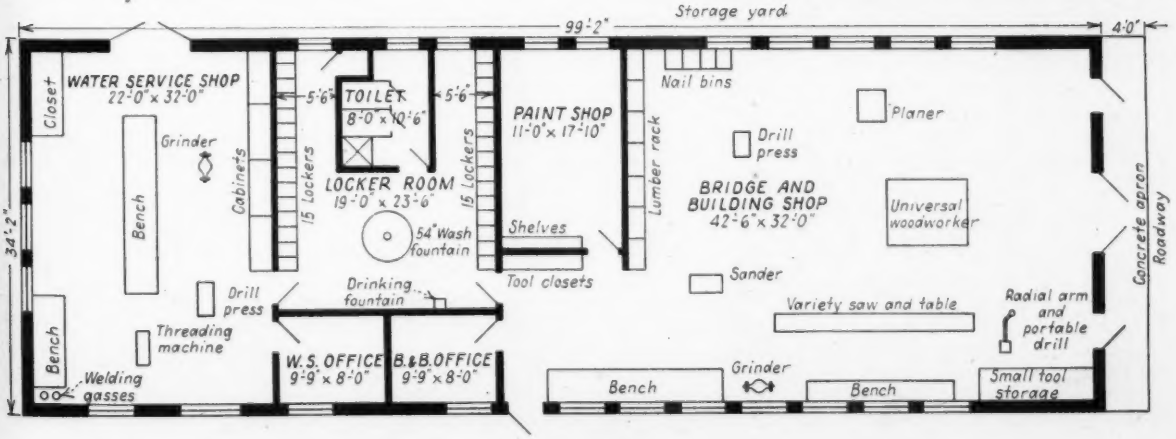
The new bridge, building and water service shop at Pueblo, the first of the shops to be built, is typical of the similar shops contemplated, except as the later shops will benefit by the experience at Pueblo and will be designed and equipped to meet the particular requirements of the different divisions. At Pueblo, the new shop is located immediately adjacent to the engine terminal and stores department area, and directly alongside a two-story frame building formerly



Right Above—The Water Service Forces at Pueblo Have a One-Ton Panel-Body Truck

Right — 1½-Ton Stake-Body Truck Assigned to the Pueblo Bridge and Building Crew

Below — General Plan of the Bridge, Building and Water Service Shop at Pueblo



Above—The Variety Saw and Table Are Used for a Wide Range of Mill Work. Left —The Sander Permits High Grade Mill and Cabinet Work

used in part by the bridge and building forces, and now turned over entirely to the stores department.

The new shop is a modern, fire-resistant structure, one story high, with a frontage of 34 ft. 2 in. and a depth of 99 ft. 2 in. In general, it is of cinder-concrete block construction on poured-in-place concrete foundation walls, carried up about 4 ft. to window-sill height, and with all exterior walls above the foundation faced with a red face brick. The roof, which has a flat pitch, consists of 2½-in. concrete slabs, supported on Steeltex prefabricated bar joists which span the full width of the building. The roof deck, which is covered with 1-in. insulating board, is protected with five-ply tar and gravel roofing. The floor throughout is of concrete, 6 in. thick on a 6-in. gravel fill, and is finished with a non-dusting, wear-resisting surface. Windows, all of the sectional type with wood sash and lower ventilating sections, line both the side and rear end walls, affording an abundance of daylighting within the building, while all exterior doors are of metal, with glazed upper panels.

Well Equipped

To meet the requirements of the various forces and classes of work carried out in the shop, the building is divided into two main shops—a bridge and building shop and a water service shop—the former, with a separate walled-off paint shop, occupying the front of the building to a depth of 54 ft., and the latter occupying the rear of the building for a depth of 22 ft. Between and dividing these two shops are a locker and toilet room and separate offices for the bridge and building and water service foremen, these facilities lying in a section 21 ft. wide continuously across the building, but providing a passageway through one end of the locker room for movement between the shop areas. All partitions separating the various sections within the building, like the exterior walls, are of cinder-concrete block construction. Suspended ceilings of ½-in. gypsum board are provided throughout the buildings, painted yellow, and all wall areas are painted white, giving the interior a finished effect. The floors are colored red with an integral coloring, and all interior doors, frames, racks and bins are of wood, painted gray.

Within the bridge and building shop section, except for the paint shop in one corner, the area is given over entirely to power wood-working machines, racks, bins and work benches, in an arrangement as shown on the accompanying plan. The machines, which are a feature of the shop to speed up and reduce the cost of the various operations, include the following, either already installed, or to be installed as soon as they become available:

Universal woodworker (5-hp. motor)
Universal variety saw (5-hp. motor)
Crescent P-18 planer (5-hp motor)
No. 15 Buffalo drill press
Hammond "600" power sander
U. S. No. 500 Utility grinder
Porter cut-off saw table
Radial arm bracket for portable drill

These machines, all of which are individually electric-motor-operated, are supplemented by a No. 2 American variable-belt feed saw mill, located in a shed-covered area just outside the building, for framing large bridge timbers, and by a wide range of hand tools, some power operated, the latter including a portable 1-in. drill, a portable electric sander, a ½-in. electric drill, and an electric hand saw. Other equipment includes the necessary bench vises and a Stanley mitre box.

Work benches are located along the outer walls, where best daylighting prevails; a lumber rack is located against the paint shop partition; and a special wired-in area, normally kept locked, is afforded for the storage of small tools.

The paint shop, or room, which is little other than a walled-off area in the bridge and building shop proper, is 17 ft. 10 in. by 11 ft. and is equipped with the necessary shelves for the storage of painting materials. This room, which is provided to segregate all painting work from the other shop operations, is served by a single door from the shop proper, and is provided with two windows in one end for daylighting.

General access to the bridge and building and paint shops is through the front end of the building, which is fitted with a double, side-hinged trucking door opening for the handling of materials, and with two flanking single doors for normal movements of the bridge and building force. All of these doors are of steel construction and, as mentioned earlier, have upper panels of sectional glass to aid in the daylighting of the interior.

Water Service Shop

The water service shop, occupying the rear end of the building, has a clear floor area 32 ft. by 22 ft., is well daylighted by windows, and is served by a

double doorway in one end. This shop is finished throughout like the bridge and building shop, with a suspended gypsum-board ceiling, painted yellow, white painted walls, and a red-surfaced concrete floor.

The principal equipment and other facilities provided in this shop include a large central steel work bench, 3 ft. by 16 ft., and 3 ft. 6 in. high; a power-operated pipe-threading machine; a pedestal-type grinder; two portable electric drills, one ¼ in. and smaller, and the other ¼ in. to ¾ in.; a drill press; a Skinner valve and bibb reseater; a Reed No. 2-71 self-feeding reamer; a Giant pipe pusher; pipe taps ⅛ in. to 2½ in.; and miscellaneous hand tools. The equipment housed here also includes oxy-acetylene cutting and welding equipment and a portable 300-amp. arc welding machine—this latter equipment being available for use by both the bridge and building and the water service forces.

Other facilities in the shop include well-organized and constructed auxiliary work benches, closets for parts and fittings, and partitioned cabinets for small tools, digging tools, block and tackle, and miscellaneous fittings. Outside storage for the larger materials and supplies of both the bridge and building and water service forces is provided in a large cinder-paved and fenced-in area along one side of the shop, which also permits trucking directly to any point of the building.

Other Facilities

The locker room, which has a floor area of 23 ft. 6 in. by 20 ft., and a ceiling height of 8 ft. 10½ in., has a concrete floor and is unusual in that it houses, centrally along its outside wall, a fully-enclosed toilet room, 10 ft. 6 in. by 8 ft. 6 in., equipped with two water closets and a shower stall. In this arrangement the side walls of the locker room are unobstructed, and each has been lined with 15 steel lockers. This arrangement also affords daylight directly within the toilet room and along both banks of lockers. Within the inner end of the locker room, in an unobstructed area between opposite locker faces, is a 54-in. Bradley wash fountain, and also the passageway between the bridge and building and water service shops.

The two foremen's offices, occupying the remaining space between the two main shop areas, are located back to back, directly along the building side wall, opposite the locker room. These offices are 9 ft. 9 in. by 8 ft. in plan, and each has an outside window and a doorway leading into its respective shop section. Each office is equipped with a desk and chair, a clock and a telephone, and the partition wall between the offices contains a low hinged window, through which the foremen can converse or pass papers, as necessary.

Incandescent lighting, with .drop-type, shallow-bowl, enamel reflectors, is used generally throughout the entire shop, although fluorescent lighting fixtures are installed in the foremen's offices and over certain of the more important work benches. Furthermore, dome-type lighting fixtures are provided in the paint shop and opal-globe fixtures in the locker and toilet rooms. Weather-proof lights are provided on the exterior faces of the building over each exterior doorway.

General heating of the building is by means of Trane, ceiling-hung, thermostat-controlled unit heaters, one such unit, of adequate capacity, being located in each of the two main shop areas and in the locker room. Wall-hung, sectional radiators afford local heating in the foremen's offices, the toilet room and the paint shop. Steam for all heating is furnished by the terminal boiler plant.

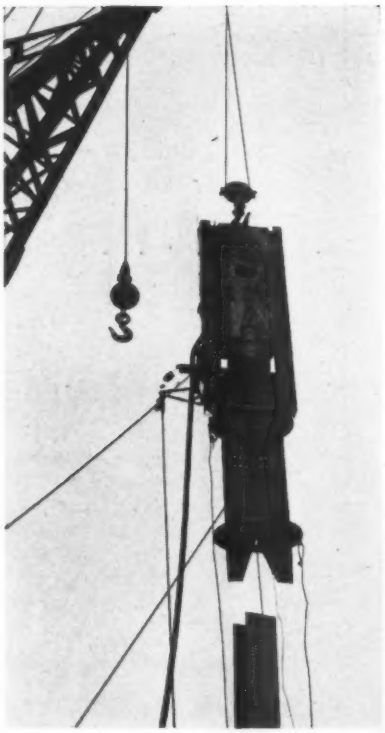
Developing Pattern

In this new shop, the D. & R. G. W. is developing the pattern for similar facilities and mechanized operations at its other division points. Here, the bridge and building crew ranges from 15 to 20 men and the water service force from 2 to 3 men, depending upon conditions. Here too, the bridge and building force is equipped with a 1½-ton stake-body truck, which is used to transport men, equipment and materials, while the water service force has a 1-ton panel-body truck.

Under the plan set up, certain of the bridge and building force are employed continuously at the shop, the

(*Continued on page* 281)

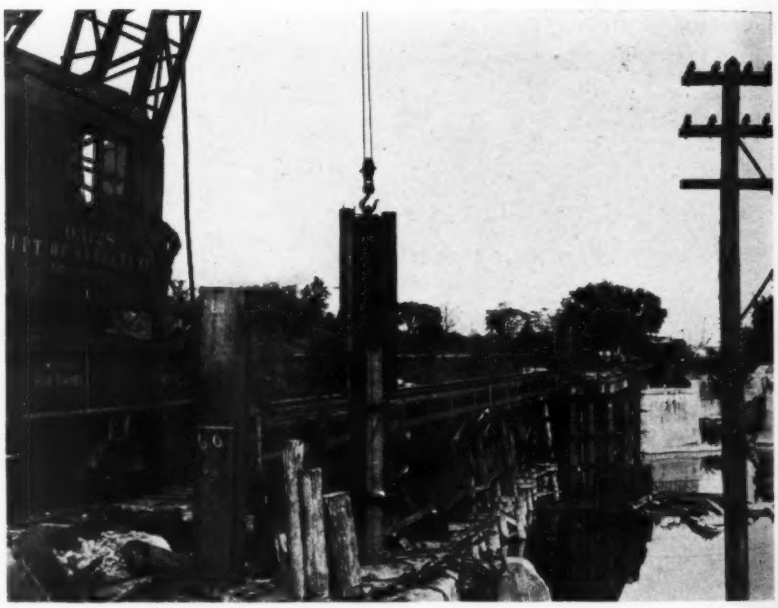
Right—One of the Drill Presses. Below Left—General View of the Water Service Shop. Below Right —Power Grinder



Above — Showing the Pile Pick-Up and Guide Attached to the Driving Hammer. Right—Driving one of the Steel Piles in the Chemung River Trestle

New Hammer Guide Pe

To meet the special conditions presented by an emergency, calling for the driving of steel bearing piles in bent on centers up to 36 ft., several devices were developed on the Erie recently, including a pile pick-up and guide, which holds the hammer securely on the pile, permits driving with a loose hammer line, and dispenses with the need for leads with their limited reach. Also developed, and described in this article, was a floating template to simplify and speed up the accurate spotting of the piles in each bent.



LAST year, when driving a steel pile trestle across the Chemung river, near Corning, N. Y., to replace a washed-out, three-span, double-track bridge, several devices were developed on the Erie that facilitated and speeded up the handling, spotting and driving of the piles, and at the same time minimized interference with train operation. The more important of these was a combination pick-up and pile guide device, attached to a steam jet hammer, which permits the lifting and carrying of piles with the hammer, the driving of the piles without leads, and the centering of the hammer directly over piles so the blow is truly axial. The device also precludes the need for a special lug-equipped driving head and makes possible the use of a loose hammer line, so that the full weight of the hammer is carried by the pile during driving operations. Another device developed was a floating template for spacing the piles accurately in each bent, which, after all of the piles had been driven, could be quickly threaded off their tops or separated into two parts for removal and reuse.

The circumstances which led to the development of the hammer arrangement involved the driving of a steel bearing pile bent trestle for the eastward main track of the river crossing, with the bents on centers up to 36 ft., which did not permit the use of an ordinary pile driver or crane equipped with fixed leads, with their limited reach, without operating from the adjacent live track, and thus either interfere with train operations or seriously delay the progress of the work. With the hammer arrangement developed, neither occurred, and, coupled with the template, operations were speeded up far beyond what could have been expected otherwise.

Timber Piles for Early Work

At this location the original bridge, consisting of three through-truss spans, each 140 ft. long, crossed the river at a skew of about 45 deg., but in a general east-west direction. The trusses were supported on concrete abutments and piers, except for the more westerly pier, which was of stone masonry.

During a flood last spring the stone masonry pier gave way under the pressure of the water and debris and toppled downstream to the south, carrying with it the two supported spans. The most easterly of the three spans remained in place, but, with buckled top and bottom chords, was pulled out of level and alinement at its water end.

Expediency and conditions at the site dictated the driving of a single-track timber pile trestle in the two openings created by the washed-out spans to carry the westward track, because here the waterway was free of the span wreckage, and timber piles were available. Conditions also called for timber falsework bents beneath the floor system of the stand-

Permits Driving Piles Without Leads

ing span, thus to permit single-track operation over the westward track at the earliest possible date.

In driving the timber piles, which progressed from both sides of the crossing simultaneously, a regular steam pile driver worked eastward from the west end, driving six-pile bents on 12-ft. centers in the two clear openings. The bents were double capped and were decked with four 8-in. by 16-in. stringers to carry each track rail. Beneath the five floorbeams of the damaged easterly span, double six-pile bents were driven on the alinement of the westward track. However, on the alinement of the eastward track, beneath these same floorbeams, only double two-pile bents were driven since the eastward track was not to be put back in service immediately and these bents were to be called upon to carry only the dead load of the south half of the span.

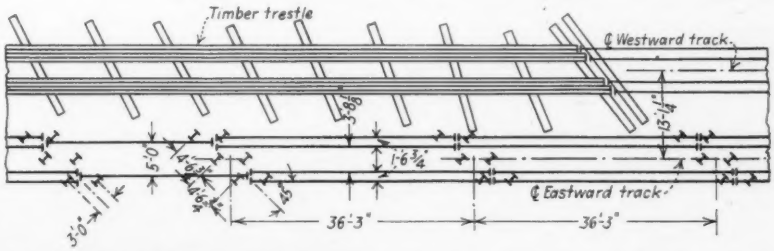
A steel erecting crane with a 50-ft. boom and no leads was used in the driving of the span-supporting bents, and to permit this the top lateral bracing between trusses was cut out, as required, and the deck ties were spread at the bent locations. No special arrangement was used to facilitate the driving of these piles without leads, but the work was simplified somewhat by the lateral support given to the piles by the deck ties during driving operations.

When the falsework support for the east span had been completed, the steel trusses were dismantled above the floor system and were removed, following which the old deck was leveled up and jacked laterally to correct alinement, and its westward track connected up with that over the new pile trestle built in the other two waterway openings. This permitted the restoration of single-track operation.

Second Track With Steel Piles

During the pile driving for the westward track, in which piles of 45 to 50 ft. in length were used, the difficulty encountered in securing adequate penetration, and of getting the piles started in the vicinity of the failed masonry pier because of the rubble on the river bottom, gave rise to the decision to use steel bearing piles in rebuilding the south half of the bridge. Here, the design prepared called for six-pile skewed bents, each with two lines of three piles each, with the bents spaced on centers ranging from 30 ft. 9 in. to 36 ft. 3 in. The design also called for prefabricated header beams for the bents and prefabricated vertical bracing between the piles, factors which required that the piles be driven true.

Driving for the eastward track began at the east end of the crossing,

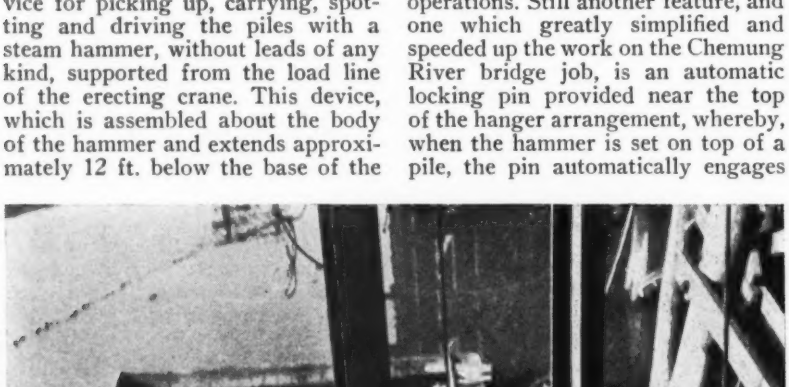


Above—Plan of a Part of the Chemung River Trestle Showing the Arrangement of the Steel Piling Supporting the Westward Track. Left—View of the River Crossing Taken Shortly After the Flood

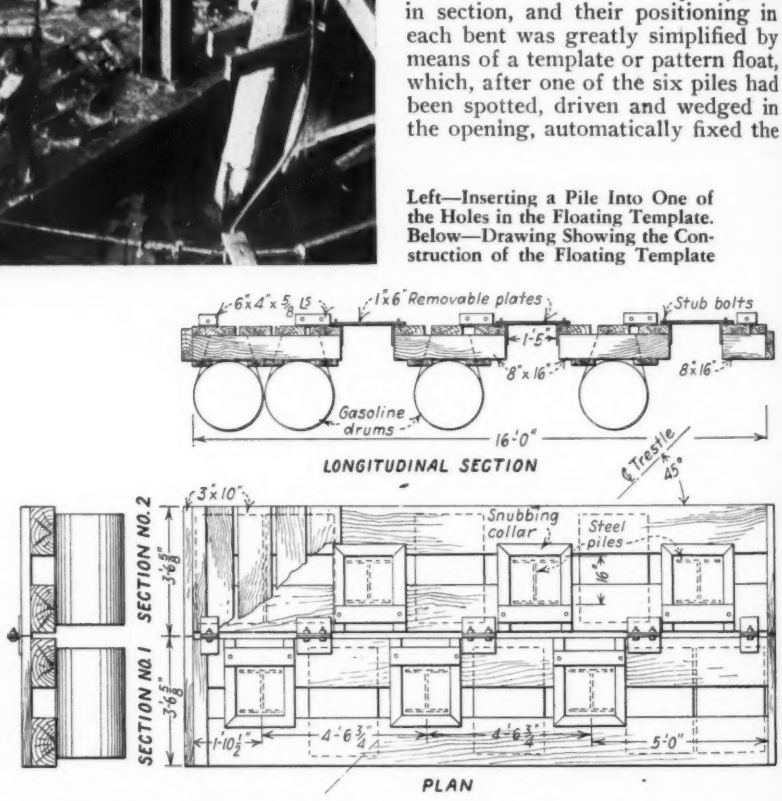
beneath the deck of the old east span, because of the large amount of work involved in clearing the river bed of the toppled trusses, as well as of 14 cars which had fallen into the river along with the spans. In this clearing work the old steelwork was burned off above the water level and was pulled out in pieces by a locomotive crane working from the stubbed end of the eastward track at the west end of the opening, entirely in the clear of traffic. Underwater cutting was done with both electric and oxy-acetylene underwater cutting torches, and the steel was removed by the crane, employing six-sheave blocks where necessary.

Faced with the driving of the steel bearing piles for the eastward track in bents as much as 36 ft. center to center, and the necessity of avoiding interference with traffic on the west-

ward track, which was being used for two-way operation, those in charge of the work developed a device for picking up, carrying, spotting and driving the piles with a steam hammer, without leads of any kind, supported from the load line of the erecting crane. This device, which is assembled about the body of the hammer and extends approximately 12 ft. below the base of the driving head, consists essentially of two I-beams bolted to the opposite sides of the body of the hammer, one on each side, which extend about four feet below the driving head and, in turn, support between their lower ends, directly beneath the driving head, two vertical steel guides, each about 10 ft. long, for holding the hammer securely and in axial alinement on top of the piles being driven. These latter guides are heavy I-beams bolted to opposite supporting hanger beams. The special feature in this arrangement is that the guide beams are of such web depth that their facing flanges are about one inch apart, permitting the web of a steel bearing pile to be threaded between them throughout their full length, until the top of the pile comes to rest directly beneath the driving head of the hammer. An open throat 18 in. wide at the bottom end of this arrangement facilitates entering the web of the pile between the guides. In other words, the device simply provides a fixed arrangement below the hammer to slip neatly over the top of a pile and to hold the hammer centered securely over the pile during driving.



Left—Inserting a Pile Into One of the Holes in the Floating Template. Below—Drawing Showing the Construction of the Floating Template



Steel Collar Guides

Another feature of the arrangement is two steel collar guides looped around the downward protruding guide beams, one near their bottom ends, and the other higher up, to which guy cables can be attached to keep the piles in line during driving operations. Still another feature, and one which greatly simplified and speeded up the work on the Chemung River bridge job, is an automatic locking pin provided near the top of the hanger arrangement, whereby, when the hammer is set on top of a pile, the pin automatically engages a hole provided in the pile web about two feet from the top. Thus, using the crane and guide-equipped hammer, steel bearing piles can be picked up, headed under the hammer, carried to position and set ready for driving. The pin, spring equipped, is readily pulled out by a rope line, so that the hammer and device can be removed from the pile when desired. At no time is it necessary for a man to work near the top of the pile.

In the work on the Chemung bridge the individual steel piles were set up near the ends of the bridge, one at a time, in a frame at each end made up of angles bolted to the abutment, where they could be readily picked up by the guide-equipped hammer and carried out to driving position. Setting up of the piles in the frames, as well as other auxiliary lifting work on the job, was done by a second crane with a 36-ft. boom. Another detail on the job was a short "parking pile" driven at each end of the bridge, consisting in each case of a short section of steel bearing pile, on which the steam hammer, with its attachment, could be set when not needed, freeing the crane for other operations.

Floating Template

The steel piles used in the trestle construction were 14 in. by 14½ in. in section, and their positioning in each bent was greatly simplified by means of a template or pattern float, which, after one of the six piles had been spotted, driven and wedged in the opening, automatically fixed the correct position of the other five piles. This float, of timber construction, was supported on a series of steel, air-tight drums, and was provided with six rectangular holes through its deck, arranged to the pattern of the pile spacing—each of the holes being faced around its top edge with a steel angle collar neatly fitting the pile section.

Another feature of the float was that it was built in two halves longitudinally, bolted together through heavy steel angles on the top side, an arrangement which permitted the separation of the two halves and release of the float after all six piles

in any bent had been driven. And this feature was made use of generally in the Chemung River bridge work, although on a number of occasions the entire float was picked up as a whole by the crane and threaded off the tops of the driven piles, to be moved to a new location.

That accurate driving of the piles was possible with the hammer guide attachment is seen in the fact that the template could be readily lifted off many of the pile assemblies, without binding, and in the further fact that the prefabricated headers and vertical bracing of the bents were set in place, and welded, with only minimum adjustment of the tops of the piles. Thus, the Erie believes that out of its unfortunate experience in the destruction of its Chemung River bridge near Corning, it developed several devices which not only speeded up and reduced the cost of the restoration work at that point, while avoiding interference with traffic, but which will prove equally effective and advantageous on many similar types of work in the future. In fact, it is felt that, with slight modification of the pile pick-up and guide device, it can be used as effectively with timber piles as with steel bearing piles.

The rebuilding of the Chemung River crossing was carried out by the bridge, erection forces of the Erie under the general direction of I. H. Schram, chief engineer, and under the immediate supervision of A. A. Visintainer, assistant engineer of structures, who developed the pile hammer attachment described.

B. & B. Gangs on the D. & R.G.W. Mechanized

(*Continued from page 277*)

number varying with the amount of field work under way and the necessary amount of shop operations. As already pointed out, plans call for an increasing amount of prefabrication work at the shop, as well as much cabinet and mill work as time and conditions will permit. Already, in view of the difficulty of obtaining finished mill work, including doors, sash and frames, the ability to produce these readily at the shop has permitted a large amount of building repair work that would otherwise have been impossible. Likewise, an increasing amount of timber preframing is being carried out at the shop, especially for patch work, and eventually this will be broadened to include a much wider range of operations.

Structural steel work will also be carried out at the shop on an increasing scale, the plan being to prefabricate as much material as possible at this point, taking full advantage of the power equipment and tools provided, and to minimize the extent of operations in the field.

The reorganization and re-equipping of the bridge and building and water service forces on the Rio Grande are being carried out under the direction of A. E. Perlman, chief engineer, with the hope of completely mechanizing and motorizing all of the divisions within the next few years.

Planning Equipment-Buying Programs

(*Continued from page 265*)

the standardization of units of maintenance of way equipment, as to types, as desirable. This is particularly so in the case of equipment where the number of units involved is considerable, such as the motor car. Fortunately, experience has shown that the number of men serviced and the nature of the work on which they are engaged will determine the type of car to be used. We have found that the A.R.E.A. classification of five principal types of motor cars adequately covers the range of maintenance of way requirements. Further simplification can be had by restricting the diversity of makes of cars purchased.

By following the foregoing procedure, it is possible to keep the stock of repair parts needed to the minimum. The stocking of repair parts, however, is a matter of no great concern in the case of some equipment items. Automobiles and trucks are a case in point, for repair work on them is usually done at local garages by the manufacturers' representatives, who either carry the repair parts in stock or who can obtain them from a distributor. This is also true to a certain extent of quite a number of machines, such as air compressors and their auxiliaries, electric motors, and many small tools, for supply houses, acting as manufacturers' agents, are readily accessible along the lines of most railways. One desirable feature in standardization of equipment is that, the smaller the variety of equipment on which our mechanics, road repair men and operators are required to work, the more familiar and proficient they become.

We have experienced little difficulty in securing the cooperation of most manufacturers in the actual installation of new equipment on the job. Furthermore, most manufacturers of equipment used exclusively by the railroads are very receptive to suggestions offered by our operators and other employees as to desired improvements.

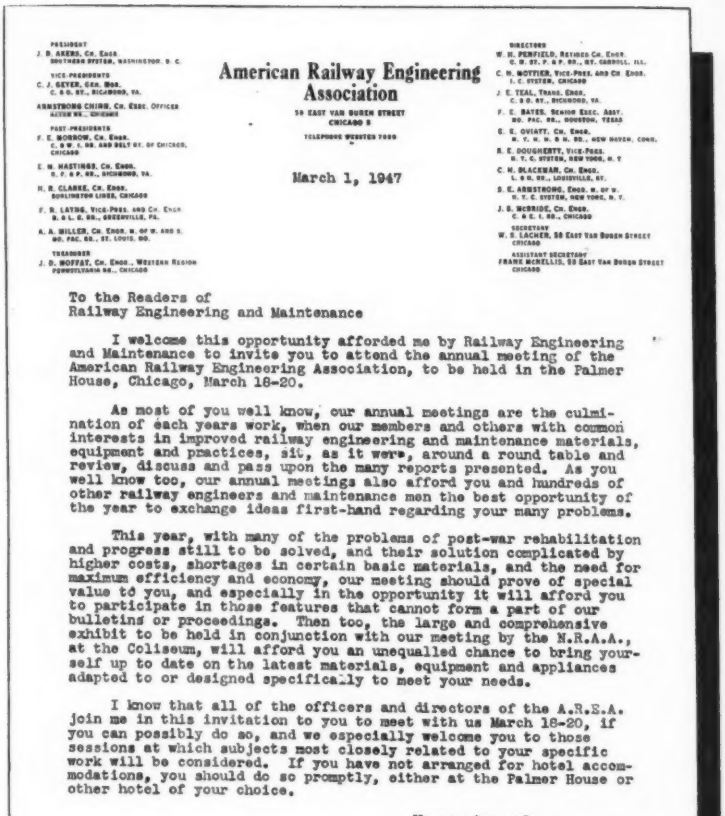
At the same time, we have found that some manufacturers, producing equipment commonly used on construction projects, are indisposed to make alterations in design or operation that will make the machines suitable for maintenance of way work. It is understandable that a manufacturer may not wish to incur the expense of a change in design, or care to interfere with mass, assembly-line production methods, unless he is sure that the demand for the altered machine will be sufficient. However, he should not overlook the fact that demand on the part of the railways is necessarily contingent upon the availability of equipment that will do the work required.

Rail-Laying Gang on the Atlantic Coast Line

Plans Complete for of the A.R.E.A.

J. B. Akers
President, A.R.E.A.

Our readers are invited by President Akers to attend the association's three-day session on March 18-20. Because of the many difficult problems of the day Mr. Akers feels that the meeting will be especially valuable this year to those attending



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March 1, 1947

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ASSISTANT SECRETARY
FRANK McNELLIS, 59 East Van Buren Street
CHICAGO

To the Readers of
Railway Engineering and Maintenance

I welcome this opportunity afforded me by Railway Engineering and Maintenance to invite you to attend the annual meeting of the American Railway Engineering Association, to be held in the Palmer House, Chicago, March 18-20.

As most of you well know, our annual meetings are the culmination of each years work, when our members and others with common interests in improved railway engineering and maintenance materials, equipment and practices, sit, as it were, around a round table and review, discuss and pass upon the many reports presented. As you well know too, our annual meetings also afford you and hundreds of other railway engineers and maintenance men the best opportunity of the year to exchange ideas first-hand regarding your many problems.

This year, with many of the problems of post-war rehabilitation and progress still to be solved, and their solution complicated by higher costs, shortages in certain basic materials, and the need for maximum efficiency and economy, our meeting should prove of special value to you, and especially in the opportunity it will afford you to participate in those features that cannot form a part of our bulletins or proceedings. Then too, the large and comprehensive exhibit to be held in conjunction with our meeting by the N.R.A.A., at the Coliseum, will afford you an unequalled chance to bring yourself up to date on the latest materials, equipment and appliances adapted to or designed specifically to meet your needs.

I know that all of the officers and directors of the A.R.E.A. join me in this invitation to you to meet with us March 18-20, if you can possibly do so, and we especially welcome you to those sessions at which subjects most closely related to your specific work will be considered. If you have not arranged for hotel accommodations, you should do so promptly, either at the Palmer House or other hotel of your choice.

Yours sincerely,

J. B. Akers, President

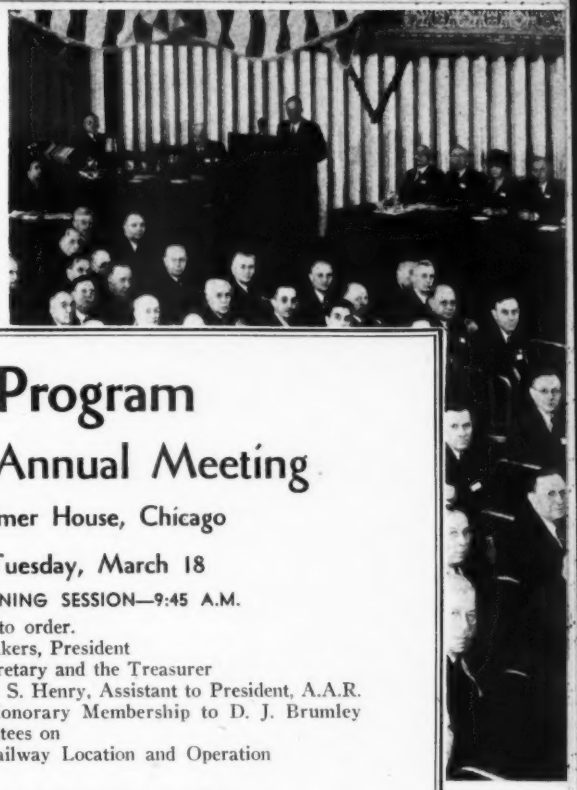
RAILWAY engineering and maintenance officers of the United States and Canada, again pooling their efforts in attacking the formidable array of problems confronting them today, will meet in Chicago on March 18-20, under the auspices of the American Railway Engineering Association. Since this will be the second full-scale three-day convention to be held since the end of World War II, the activities of the association may now be considered to be back in full swing following the difficult years of the war when several of the annual meetings had to be cancelled. As in past years the meeting will be held in the Grand Ballroom of the Palmer House.

In line with customary practice the meeting will consist for the most part of the presentation of reports by 22 committees of the association on a total of 95 subjects covering a multitude of problems now confronting engineering and maintenance officers, although these reports will be interspersed at various times with a number of addresses dealing with a variety of subjects of special interest. In addition to the address of the president and the reports of the secretary and the treasurer, the opening session on Tuesday morning will be featured by an address by Col. R. S. Henry, assistant to president, Association of American Railroads. Another special feature of this session will be the presentation of an honorary membership in the association to D. J. Brumley, a past-president of the association, and retired chief engineer, Chicago Terminal improvements, Illinois Central.

On Tuesday afternoon the session will be somewhat abbreviated, adjourning at 4:30 p.m. to permit those in attendance to view the exhibition of equipment and materials of the National Railway Appliances Association at the Coliseum. Complete details regarding this exhibit, including a list of the exhibiting companies and a floor plan of the exhibition hall, are given on following pages.

During the morning session on Wednesday a special feature, which will be presented following the report of the Committee on Roadway and Ballast, will be an address on roadbed stabilization by Prof. Ralph B. Peck of the University of Illinois, an authority on this subject. Immediately following this feature those in attendance at the convention will

Annual Convention at Chicago



Program will include the presentation of reports on 95 subjects as well as a number of addresses on topics of pertinent interest

meet at a luncheon to hear an address by C. McD. Davis, president, Atlantic Coast Line. The Wednesday afternoon session will be featured by two addresses, both of which will follow the presentation of the report of the Committee on Rail. These addresses will be delivered by Prof. R. E. Cramer of the University of Illinois, who will speak on rail failures in general, and by G. K. Manning of the Battelle Institute, who will discuss the metallurgical aspects of shelly spots.

An unusual aspect of the session on Thursday morning will be the installation of the new officers about midway of the program, with several committee reports to be presented afterwards. Heretofore the practice has been to install the new officers after the last committee report had been presented.

The regular sessions of the meeting will be presided over by J. B. Akers, president of the association, and chief engineer of the Southern, assisted by Vice-President A. Chinn, president, Terminal Railroad Association of St. Louis. Reproduced on the opposite page is a letter from Mr. Akers extending a special invitation to the readers of *Railway Engineering and Maintenance* to attend the meeting. Citing the many post-war problems that remain to be solved, and the fact that attempts to find answers to them are being hindered by higher costs, shortages of materials and other factors, Mr. Akers expresses the opinion that this year's meeting should be of special value to engineering and maintenance officers.

Program

46th Annual Meeting

Palmer House, Chicago

Tuesday, March 18

MORNING SESSION—9:45 A.M.

Convention called to order.
Address by J. B. Akers, President
Reports of the Secretary and the Treasurer
Address by Col. R. S. Henry, Assistant to President, A.A.R.
Presentation of Honorary Membership to D. J. Brumley
Reports of Committees on
- Economics of Railway Location and Operation
- Highways

AFTERNOON SESSION—2 P.M.

Reports of Committees on
- Cooperative Relations with Universities
- Yards and Terminals
- Waterways and Harbors
- Water Service and Sanitation.

Adjournment at 4:30 p.m. to visit the exhibition of the National Railway Appliances Association at the Coliseum

Wednesday, March 19

MORNING SESSION—9 A.M.

Reports of Committees on
- Maintenance of Way Work Equipment
- Economics of Railway Labor
- Ties
- Wood Preservation
- Roadway and Ballast

Address by Prof. Ralph B. Peck, University of Illinois, on Roadbed Stabilization

ASSOCIATION LUNCHEON, 12 o'clock

Address by C. McD. Davis, President, Atlantic Coast Line

AFTERNOON SESSION—2:30 P.M.

Reports of Committees on
- Buildings
- Track
- Rail

Address by Prof. R. E. Cramer, University of Illinois, on Rail Failures
Address by G. K. Manning, Battelle Institute, on The Metallurgical Aspects of Shelly Spots

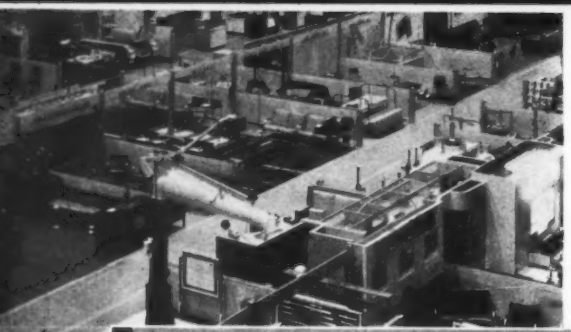
Thursday, March 20

MORNING SESSION—9:00 A.M.

Reports of Committees on
- Uniform General Contract Forms
- Records and Accounts
- Waterproofing
- Impact and Bridge Stresses

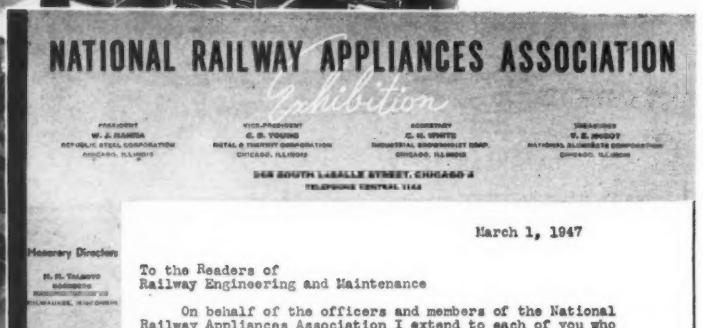
Installation of Officers
Reports of Committees on
- Masonry
- Iron and Steel Structures
- Clearances
- Wood Bridges and Trestles

Adjournment



N.R.A.A. to Hold

Plans made for largest display in 25 years of materials, devices and equipment. To be held at Chicago coincident with annual meeting of the A.R.E.A. In letter at left our readers are invited by President Hanna of N. R.A.A. to see the exhibit



NATIONAL RAILWAY APPLIANCES ASSOCIATION

Exhibition

W. J. HANNA, President, Republic Steel Corporation, Chicago, Illinois

C. H. WHITE, Secretary, Industrial Brownhoist Corp., Chicago, Illinois

C. E. MUSSOY, Treasurer, National Malleable & Steel Castings Co., Chicago, Illinois

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H. E. PENFOLD, The P. & H. Co., Chicago, Illinois

March 1, 1947

To the Readers of
Railway Engineering and Maintenance

On behalf of the officers and members of the National Railway Appliances Association I extend to each of you who reads these pages a cordial invitation to attend our Thirty-Eighth Annual Exhibit at the Coliseum, in Chicago, March 17-20, in conjunction with the annual convention of the American Railway Engineering Association.

After having been prevented by war and early post-war conditions from holding a full-scale exhibit since 1941, we give promise of an exhibit this year that, in size and scope, will exceed any of our exhibits for the last 25 years. Already, as I write this letter, more than 100 companies have arranged to have their products on display in upwards of 200 booths, and equally significant, many of these companies are exhibiting for the first time. Furthermore, among the hundreds of materials, appliances and power tools and machines to be exhibited, for all classes of roadway and structures work, will be many new and improved types and models that have never been on display before.

In the Coliseum we have a spacious exhibit hall that is convenient to the A.R.E.A. convention headquarters at the Palmer House, and the exhibit will be open each of the days of the convention, as well as on Monday preceding the convention. Another feature will be restaurant facilities for the convenience of those of you who may wish to make use of them.

Again, I extend a cordial invitation to each of you to attend our exhibit, and I especially urge you to avail yourself of the opportunity that will be yours to discuss your problems and needs with the various manufacturers' representatives who will be there to help you in every way possible.

Sincerely,

W. J. Hanna, President

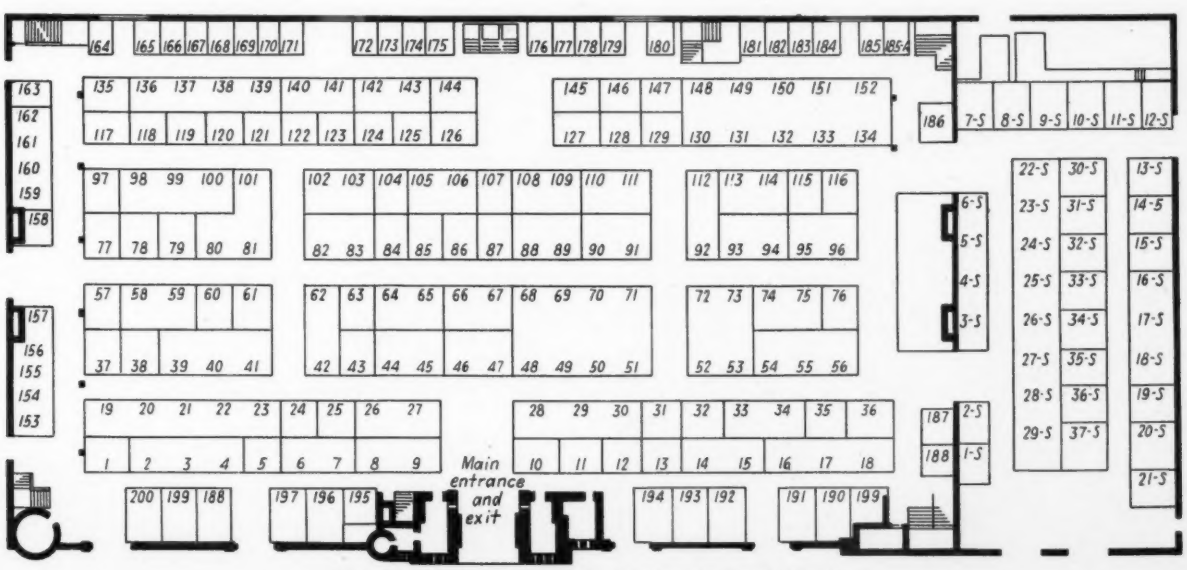
W. J. Hanna
President,
N.R.A.A.

AS INDICATED in the above letter from W. J. Hanna, president of the National Railway Appliances Association, readers of this publication are cordially invited to attend this association's thirty-eighth annual exhibit, to be held in the Coliseum, Chicago, on March 17-20, coincident with the annual meeting of the American Railway Engineering Association. This exhibit of equipment, materials and devices used in the construction and maintenance of railway tracks, bridges, buildings and water service facilities will be open four days, beginning on Monday, March 17 (one day ahead of the convening of the A.R.E.A. convention) and extending through Thursday, March 20. On each of these days the exhibit will be open from 9:00 a.m. to 6:30 p.m., except that on Thursday it will close at 3:00 p.m. Being located in the Coliseum the exhibit will be only a few minutes' ride from the Palmer House by street cars which may be boarded practically at the door of the hotel.

Many factors are expected to combine to make this an exhibit of outstanding value to maintenance men—one that will present an unusual opportunity for them to inspect the latest in equipment and materials applicable to their work. The exhibit is being directed by Mr. Hanna (Republic Steel Corporation), as president of the N.R.A.A., and C. H. White (Industrial Brownhoist Corporation), as secretary. A list of the companies that will participate in the exhibit, with their booth numbers, is presented here, together with a floor plan of the exhibit hall showing the exhibit spaces and their respective numbers.

List of Exhibitors

Annual Exhibit



Floor Plan of the Exhibit Hall, Showing the Booth Numbers

March of Machines—

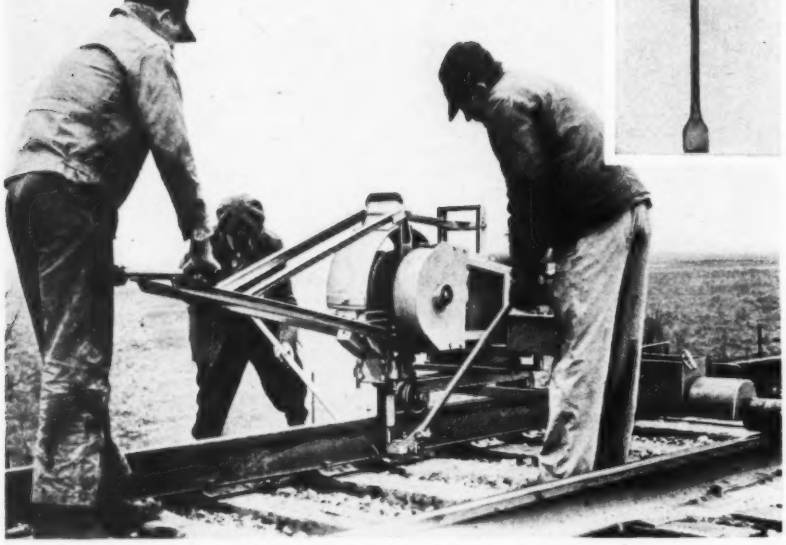
A recapitulation, in quickly readable graphic form, of most of the new and improved equipment described in our paper since the previous March issue

(1) Left—Self-contained gasoline-driven tie tamper. Strikes 1400 blows per minute and weighs 73 lb. Tamping bar actuated by compressed air from striking mechanism. *Chicago Pneumatic Tool Company*

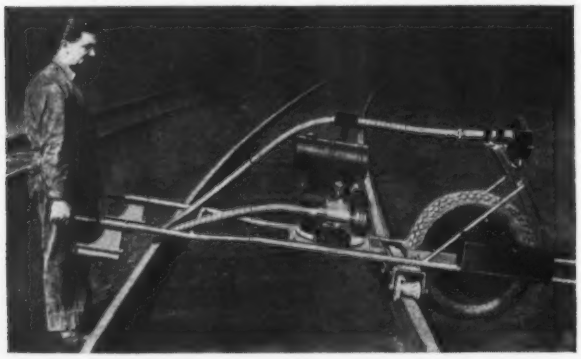
(2) Right — Pneumatic tie-tamping tool. Has coordinated valve-timing action and weighs 42 lb. with tamping bar. Known as TT-35. *Schramm, Inc.*

PROBABLY no other similar period in history has seen the introduction of so many new and improved machines applicable to railway maintenance work as the last 12 months. Unquestionably the end of the war was an important factor in unloosing this sudden outburst of machines, for it was commonly known during the war years that many manufacturers had developed new or improved equipment which they were holding "up their sleeves" until the various obstacles then preventing its manufacture should be lifted.

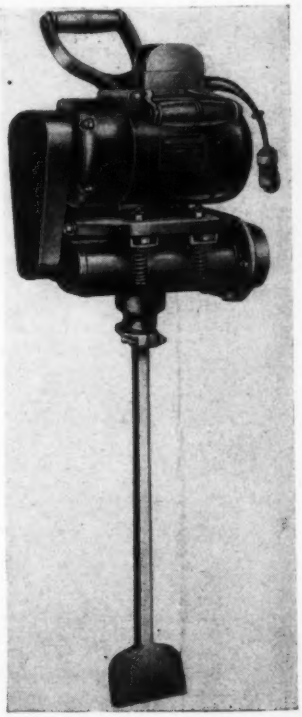
Whatever the explanation, the fact is that, as a result of the unusual number of new or improved machines that have been announced by manufacturers during the last year, the power equipment at the disposal of the railway maintenance field has been augmented in many important



(3) Above—Improved Nordberg spike-driving hammer. Revolving frame carrying all operating parts is now more compact, metal guards have been added and entire machine has smoother appearance. Said to drive 800 spikes an hour. *Nordberg Manufacturing Company*



(4) Left — Wheelbarrow-type flexible-shaft grinder for free-hand track grinding. Has rollers in handles for mounting on rails. Model P-40. *Railway Track-Work Company*



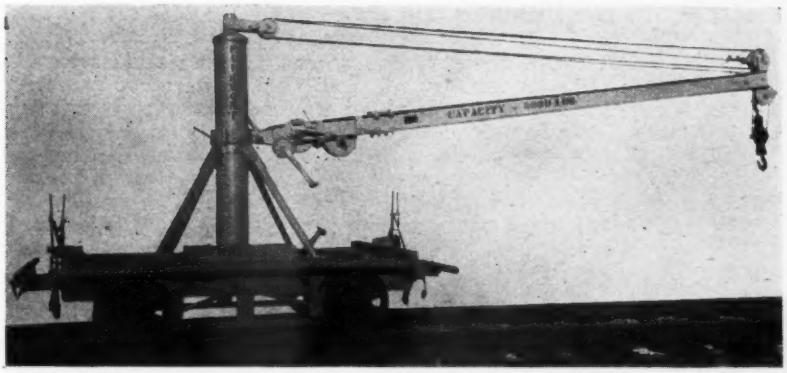
(5) Right—New electric-motor actuated tie tamper. Delivers 4,150 short, quick blows per minute. With tamping bar, the unit weighs 70 lb. *The Master Vibrator Company*

(For additional information on any of the products described on this page, use postcards, page 221, indicating key numbers)

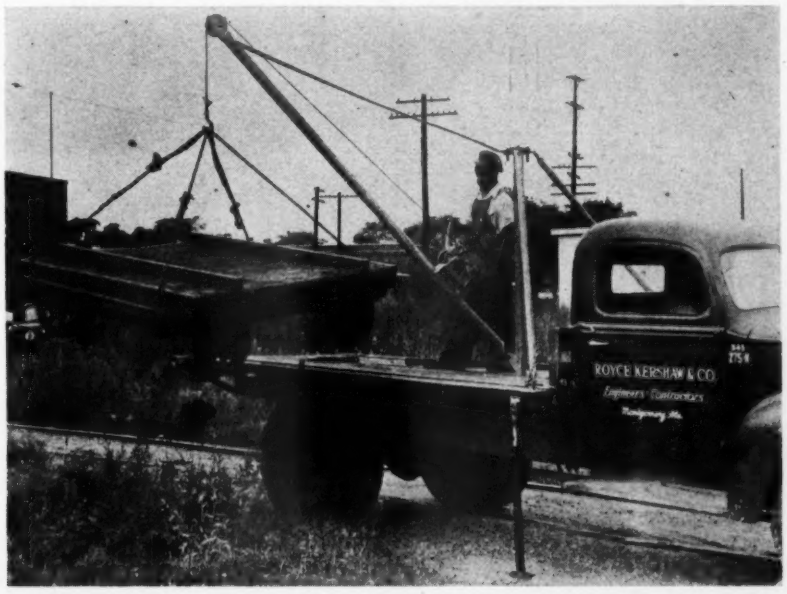
A Review

respects. Many of the newest aids are described for the first time in the "Products of Manufacturers" department of this issue. However, these comprise only part of the "crop," many others having been described in previous issues.

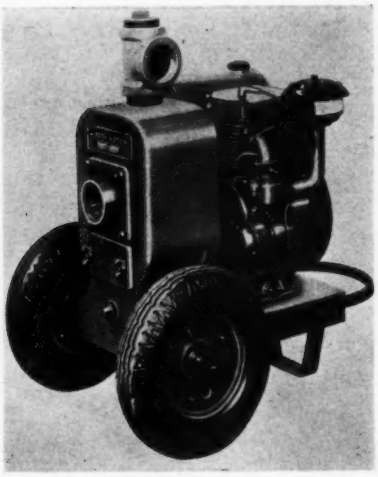
Since equipment economies comprise the keynote of this entire issue we are convinced that we could render our readers no greater service than to refresh their minds regarding these many units of new equipment that have already been described, that is, in the issues of April, 1946, to February, 1947, inclusive. This is done in these six pages, and to conserve space and the reader's time the presentations are limited to photographs and brief captions. Because of space limitations it has not been possible to depict quite all the meritorious developments.



(6) Above—New derrick car designed for safe, rapid handling of materials weighing up to 3,000 lb. Equipped with a 13-foot boom, which has a full 360-deg. pivot, the car has winches which permit one or two-man operation. The car frame is made of steel channels, while box-type construction is employed for derrick support. *Fairmont Railway Motors, Inc.*

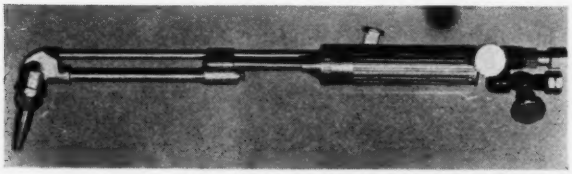


(7) Above—This demountable derrick for use on highway trucks is similar in design and operation to the track-mounted type manufactured by the same company. As adapted for use on motor trucks, the derrick has a lifting capacity of one ton and it is said the A-frame, mast and boom may be pin-connected in several positions on any type truck body. The unit is completely demountable. *Kershaw Company, Inc.*



(8) Above—One of a new line of portable, self-priming centrifugal pumps available in sizes of 1½ in. to 8 in. Made of corrosion and abrasion-resisting steel. The 1½-in., 2-in., 3-in., and 4-in. pumps have air-cooled engines. Larger sizes are water cooled. *Worthington Pump & Machinery Corp.*

(9) Below — Hand-cutting oxyacetylene blowpipe designed for railroad use. Equipped with special purpose nozzles, performs rivet-piercing, gouging and scrap-cutting. *Oxweld Railroad Service Company*

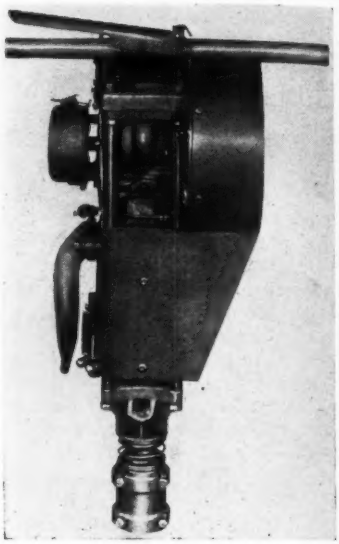


(10) Right — Portable machine for cropping relay rail. Employs two oxyacetylene cutting torches. These torches are mounted on a carriage fastened in a bolted frame which can be moved transversely by a hand screw. The frame of this unit is attached to the rail by three-point clamp. *Air Reduction Sales Co.*

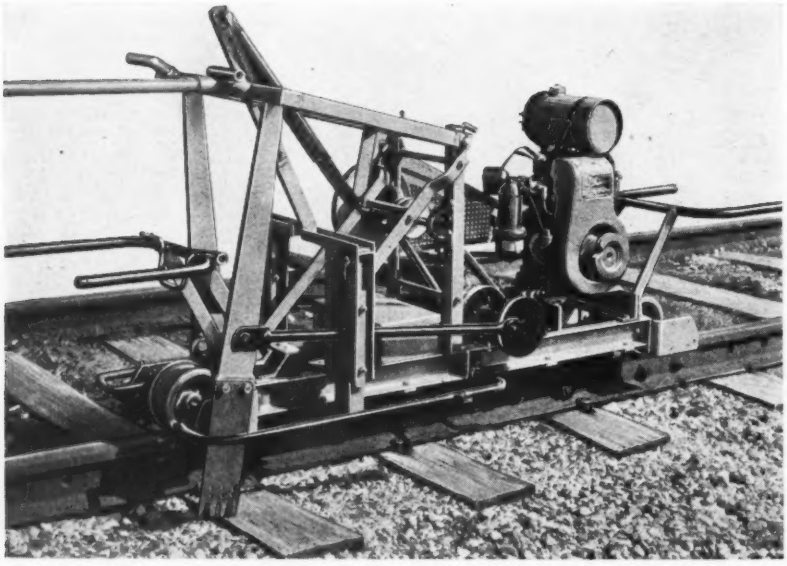
(For additional information on any of the products described on this page, use postcards, page 221, indicating key numbers)

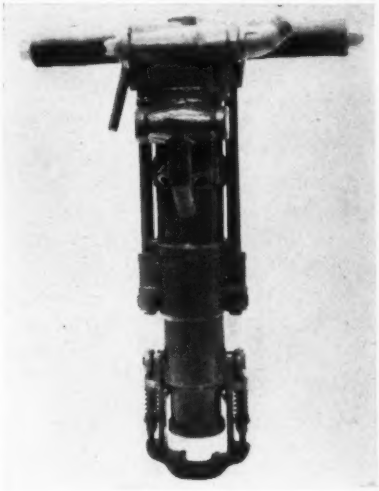
March of Machines—

(11) Left — Carriage for use by workmen setting spikes for rail renewals. Designed to roll along the track, the unit includes a spike-carrying receptacle with a capacity of 1½ kegs of spikes. It is possible to use carriage on either rail. Men face in direction of movement. *Kershaw Company, Inc.*



(14) Above—Portable, gasoline-powered hammer spike driver. Entirely self contained unit, the machine weighs 92 lb. Power for the tool is provided by a single cylinder, air-cooled engine. *Syntron Co.*

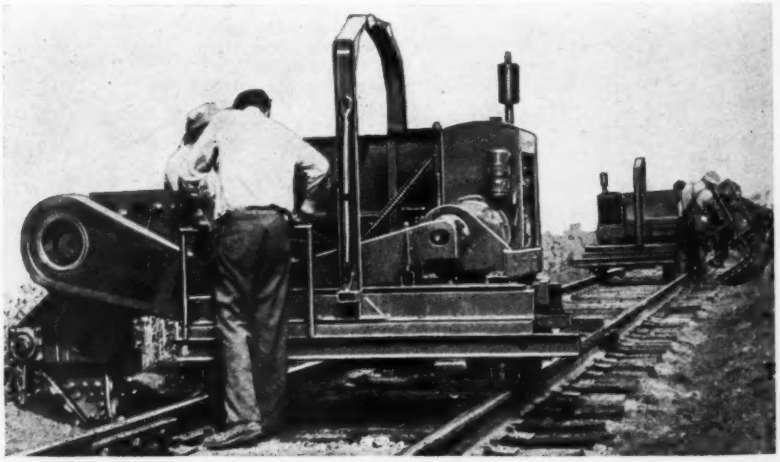




(12) Above—Improved tie-cutting machine now adapted for use in scoring ties. Design incorporates an additional reciprocating arm and saw blade and is equipped with adjustable stops for controlling the depth of scoring cut. *Woolery Machine Company*

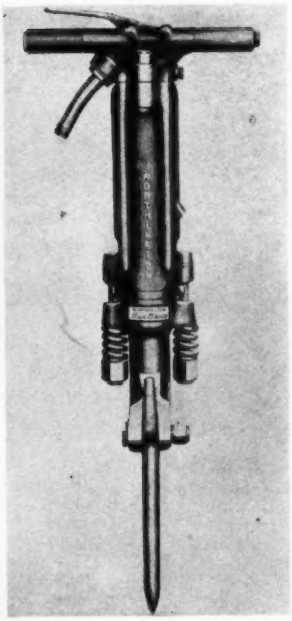
(15) Right—Rock drill. Weighs 45 lb. and has new-type valve said to permit faster operation. Drill parts are drop-forged. Available with both dry and wet-type blowers. Model D-45. *Schramm, Inc.*

(13) Above—Pneumatic impact wrench. Drives and removes nuts, bolts and cap screws up to ⅜ in. and weighs 3¾ lb. Its design eliminates gears and fastenings. *Independent Pneumatic Tool Company*

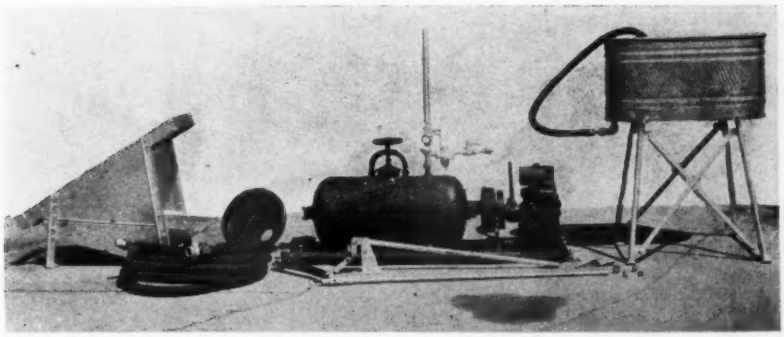


(16) Right—On-track machine for excavating ballast and dirt from tie cribs and depositing it beyond ends of ties. Power unit, digging and excavating mechanisms are supported on a four-wheel transverse carriage. The machine moves along the track on a four-wheel truck. Power is supplied by a 20-hp., 4-cylinder gasoline engine, which drives the digging and excavating mechanism. *Nordberg Manufacturing Company*

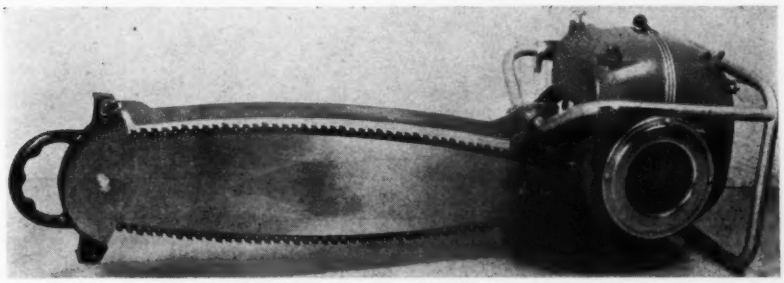
(For additional information on any of the products described on this page, use postcards, page 221, indicating key numbers)



(17) Above—Paving breaker said to embody features that increase performance, durability and ease of handling. Known as Model WB-81. *Worthington Pump & Machinery Corporation*

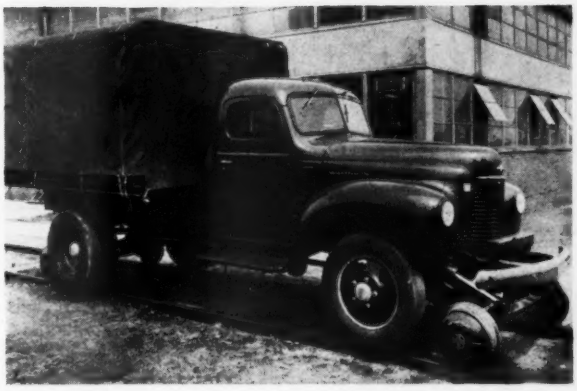


(20) Above—Roadbed grouting outfit. Principal items in the outfit are a mixer; a single-cylinder, air-cooled engine; an all-steel inclined screen, with hopper for holding sand; a 94-gal. elevated water tank; a 650-gal. water-storage tank; a hand water pump; and a centrifugal pump of 3,000 gal. per hr. capacity. Mixing and injection is said to be accomplished in three to four minutes by this unit. *Fairmont Railway Motors, Inc.*

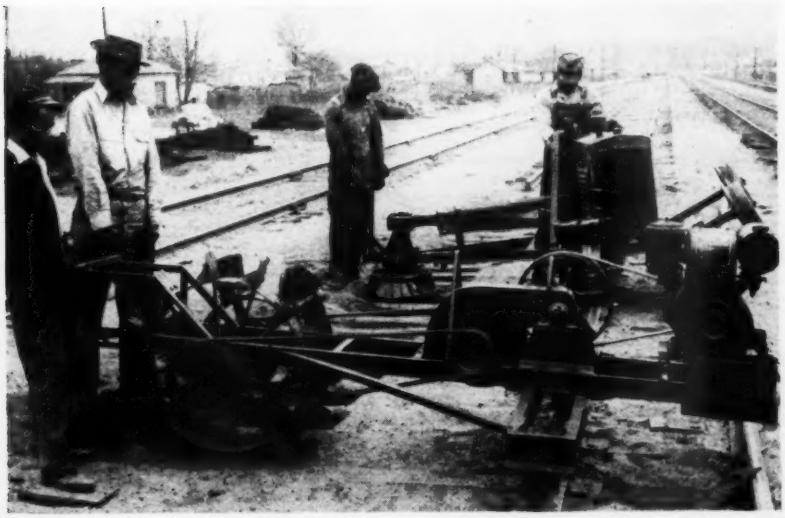


(21) Above — Gasoline - driven chain saw. Available in three sizes with cutting capacities of 20 in., 24 in. and 30 in., powered by four-hp. engines. *Reed-Prentice Corp.*

(18) Left — New 10-hp., air-cooled 4-cycle heavy - duty gasoline engine. Weighs 97 lb. Has opposed cylinder arrangement. *D. W. Onan & Sons, Inc.*



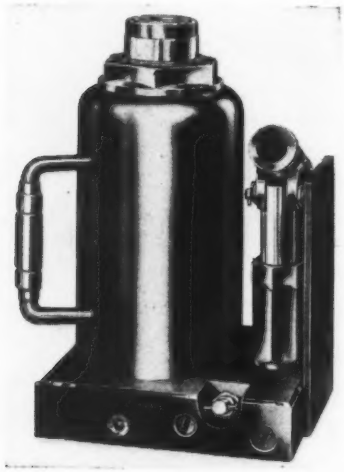
(22) Above—Improved rail-and-highway vehicle now available in four models to meet different needs. Vehicle is equipped with retractable flanged steel pilot wheels in front and rear to hold it on track. For use on the highway the pilot wheels are raised by a hydraulic retraction gear. *Evans Products Company*



(19) Left—Cribbing machine for cleaning ballast out of tie cribs. Weighs approximately 1,000 lb. A transverse steel arm, bolted to a base frame mounted on two eight-inch, double-flanged wheels, supports a digging wheel at one end, an engine at the other and reduction pulleys in between. The unit is powered by a 6.1-hp. single-cylinder engine. *Kershaw Company, Inc.*

(For additional information on any of the products described on this page, use postcards, page 221, indicating key numbers)

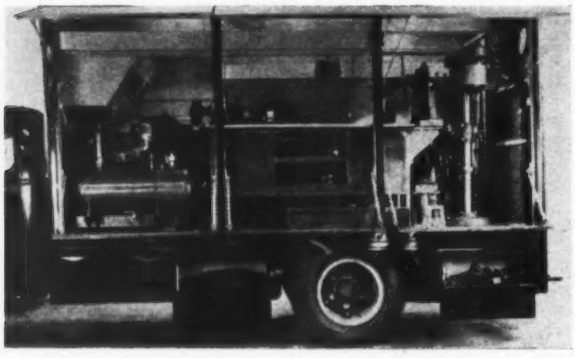
March of Machines—



(23) Above—Hydraulic jack with capacity of 25 tons. Has dual-pump arrangement for raising cap to load height. Rams and cylinders are of high-carbon seamless steel tubing. *Duff-Norton Manufacturing Company*

(27) Above—Aluminum track jack. Ratchet type, with capacity of 15 tons. Has frame made of cast aluminum alloy and weighs 38 lb. *The Buda Company*

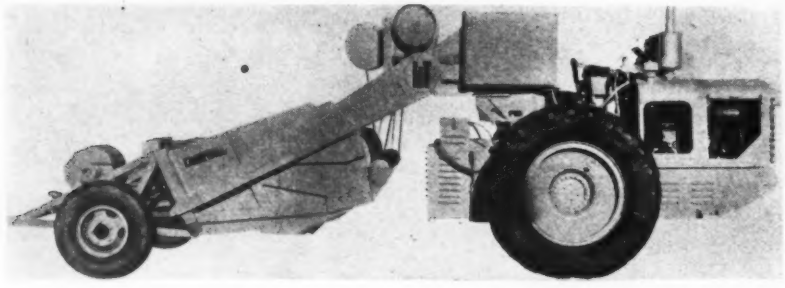
(28) Right—New 50-ton hydraulic jack. Has two-speed arrangement said to permit light or medium loads to be lifted rapidly. The jack is available in two models. *The Buda Company*



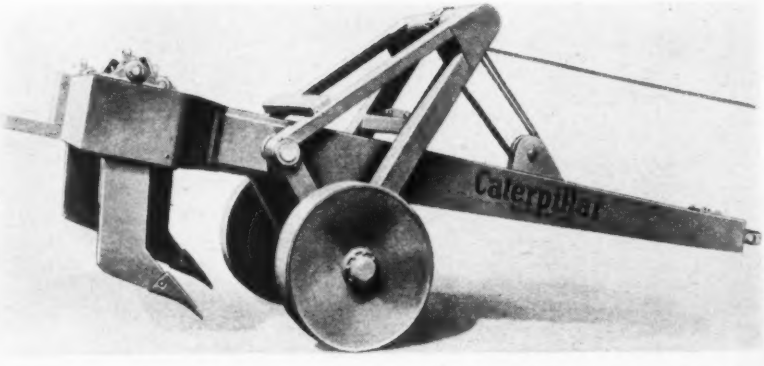
(26) Above—New ball-bearing bridge and industrial jack. 25-ton capacity; weight 140 lb. Has a closed height of 22 in. and a rise of 10¼ in. Is known as No. 2522. *Templeton Kenly & Co.*

(24) Left—Truck-mounted machine shop. Said to embody all tools needed for mechanical repair. *Davey Compressor Company*

(29) Above—Crane with choice of five interchangeable booms and ten different mountings. Unit assembly said to permit easy exchange of major components. Can be used as shovel, trench hoe, or lifting machine. Model TL-20. *Thew Shovel Company*



(25) Above — Small-capacity, high-speed Tournapull grading unit. Designed for off-track maintenance and for use as a one-man dirt-mover. The unit is equipped with Carryall scraper with a maximum load limit of four tons. *R. G. LeTourneau, Inc.*



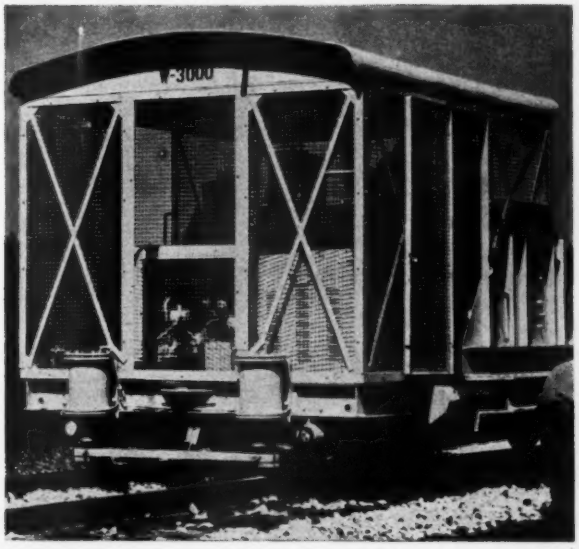
(30) Right—Cable-operated rippers in two models. Each unit is mounted on two steel-drum type wheels. Equipped with three detachable teeth said to be designed for penetration of hardest material. Models 18 and 28. *Caterpillar Tractor Company*

(For additional information on any of the products described on this page, use postcards, page 221, indicating key numbers)

(31) Below—Multi-purpose earth-moving machine. Serves as excavator, trenching machine, pipe layer, grader or ripper. *Warner & Swasey Co.*

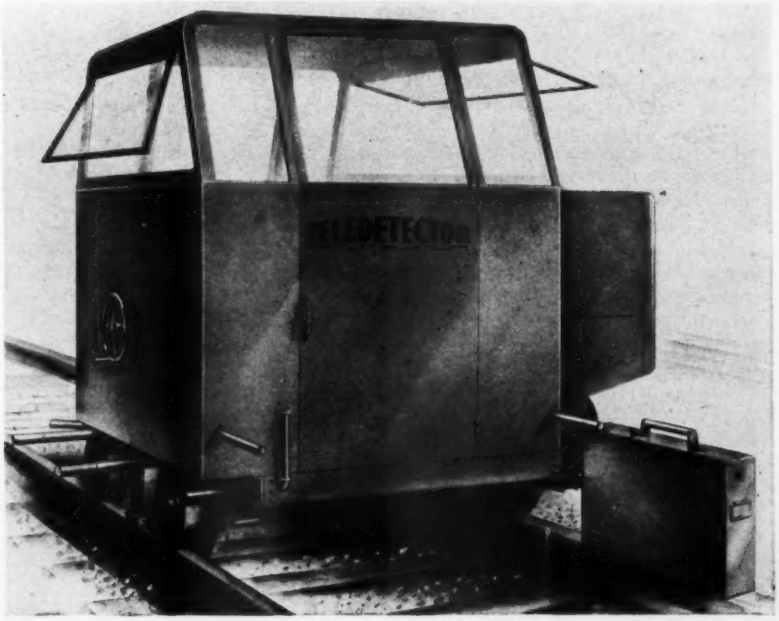
(33) Right—Small hydraulically-controlled bulldozer. Entirely front-end mounted. All movements are controlled by single lever. *Oliver Corporation*

(32) Above—Small crawler-type tractor. Powered by two-cycle Diesel engine. Has five speeds forward. Choice of 44-in. or 60-in. track gages. Known as Model HD-5. *Allis-Chalmers Manufacturing Company*



(34) Above—Improved tamping machine. Tamps both sides of a single tie simultaneously instead of one side of each of two adjacent ties as in earlier model. Said to produce uniform work in any ballast regardless of the raise. *Power Ballaster Company*

(35) Right—Rail-flaw detector car. Said to be capable of detecting and recording transverse fissures to within 3 in. of rail ends. Self-propelled unit with enclosed body, mounted on four flanged wheels. Tests one rail at a time. Detection of rail flaws as small as 15 per cent is said to be accomplished by air-core, pick-up coils operating in a trailing, sustained magnetic field. Testing equipment includes a moving-tape recording unit, an automatic paint gun, voltage-drop hand-testing apparatus and four recording pens. Generator driven by an 11-hp. gasoline engine supplies power for testing and an electric motor which propels the car. Two men operate the unit. Known as the Teledetector. *Teleweld Inc.*



(For additional information on any of the products described on this page, use postcards, page 221, indicating key numbers)

Work Equipment Budgets for 1947

(*Continued from page 261*)

exceeds the number purchased last year. This, in itself, is a good omen, pointing toward record purchases once general business conditions, labor relations and material supply problems become sufficiently stabilized that railway officers can look ahead with confidence to undertaking the enormous amount of constructive work needed and planned. When that time arrives, as surely it must, it is assured that work equipment purchases will soar, urged on by the fact that has been often proved—that in the face of high labor and material costs, it is only through the extensive and intensive use of work equipment that the normal maintenance ratio will suffice to permit the high quality and large quantity of work necessary to keep the railways abreast of competitive forms of transportation.

Uncertain Deliveries a Factor

Many of the items of equipment which tended to lower the total number budgeted for 1947 are among those that railway maintenance officers know are in short supply, and the delivery of which they cannot expect in time to do them much good in their seasonal work. In the case of such units, there has been consistent refusal on the part of many roads to set aside money for them, it being preferred to schedule the purchase of only such units as can be delivered with some degree of assurance, deferring other orders until delivery dates are at least in sight.

Another hopeful note that bears mentioning is the increasing number of new machines, designed for specific maintenance needs, that have appeared in the past year since restrictions on materials have been removed. Furthermore, there is reason to believe that as the material supply increases, more and more new devices will appear to raise the standard of maintenance work, reduce the physical effort required in performing it, and cut unit costs of production. And it has always been axiomatic, that when new machinery appears that fills an existing need, budgets are altered to provide for its purchase.

Contingencies Will Rule

Therefore, in spite of the foregoing estimates, just how large work equipment purchases in 1947 will be appears to be contingent on the clearing of the industrial picture and the cooperation of labor, with their effect on railway net earnings; the ability of the manufacturers to make delivery of equipment; and on the design and production of new machines.

What Organization for Equipment Upkeep?

(*Continued from page 273*)

that they will have the tools and parts required. Automotive equipment for both maintainers and the supervisor are rapidly becoming a "must."

Obviously, the number of machines, the different types, the location and condition of each should be a matter of record. The growth of the use of mechanical equipment has been such that the need for the clerical help necessary for keeping such data often has not been realized. If such service is not made available to the superintendent of work equipment, he will be seriously handicapped by the lack of suitable records, or he will spend on such routine work much time that would yield far greater results if given to other matters.

Central Shops

What has been said thus far has related principally to organization and field maintenance. Any machine will at times require major repairs. On some roads such repairs to small machines are carried out in division shops. On other roads, these smaller machines, together with the larger machines, will go to central shops for overhauling. Central shops may be (in the order of preference) under the control of the maintenance of way department, the stores department, or the mechanical department. In general, the work done at the central shop is corrective rather than preventive; yet the way it is done may have a large influence on the life of the machine, and its freedom from interruptions in service when it has been returned to service. If the shop is under the control of the stores or mechanical department, close cooperation between the shop superintendent and the superintendent of work equipment or his representative must be considered essential.

In this connection, a word should be said about housing the equipment when not in use. The work of some machines is seasonal. Often a machine may spend its idle time at a central shop either awaiting repairs, or awaiting return to the field. Proper housing at such times is a preventive measure that will pay good returns. This is true also of machines stored on divisions during the off season.

In this discussion, I have touched on the need for organized maintenance, the need for a better understanding as to what maintenance is, and the relation of various employees to the requirements of good maintenance. I wish here to summarize what seem to me to be the principles involved in our search for efficient maintenance of our machines.

Summary

First—That owning and using a machine does not guarantee a fair return from the investment in it. If it is out of service for long periods, or subject to frequent interruptions in service, due to its condition, it is not being well maintained, and the savings anticipated from its use will not be realized.

Second—That a studied organization for the maintenance of its equipment must be made by each railroad if efficient maintenance is to be achieved.

Third—That maintaining equipment involves much more than the making of repairs; anything that prolongs the life of a machine, or keeps it from being out of service, or shortens the time that it is out of service, due to its condition, is as truly maintenance as is the making or repairs.

Fourth—That the more we emphasize the importance of preventive measures, rather than repairs, the more efficient our maintenance will be.

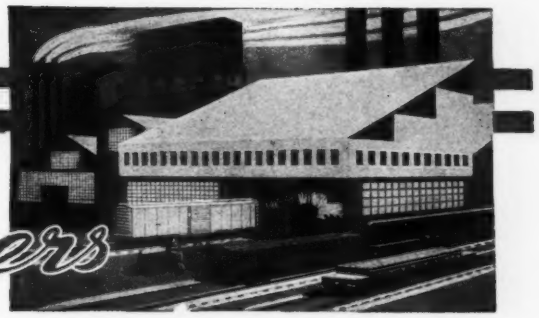
Fifth—That many maintenance of way employees other than those specifically set up for the maintenance of the equipment have a large part in determining whether the maintenance is efficient; and that still others entirely outside of the maintenance of way department can contribute much toward efficient maintenance or can do much toward making it inefficient.

Sixth—That, since so many men engaged in so many varied activities are involved in the maintenance of our equipment, cooperation among them is essential; that cooperation is based on mutual understanding, and mutual understanding on knowledge. Hence the spreading of knowledge, or training, if you please, is of prime importance.

No Criticism Intended

What I have said is not intended as criticism of any individual or any group of men. Our machines have come to us gradually to meet needs as they have arisen. It is not strange that, as they have come, we have failed in many cases to realize that their coming has developed other needs that we must now meet. Prominent among these is the need for efficient maintenance. We must realize that this is not something that can be pulled out of a mechanic's tool bag, but that, instead, it can be achieved only by the complete cooperation of many men.

PRODUCTS of Manufacturers



(For additional information on any of the products described in these columns, use postcards, page 221)

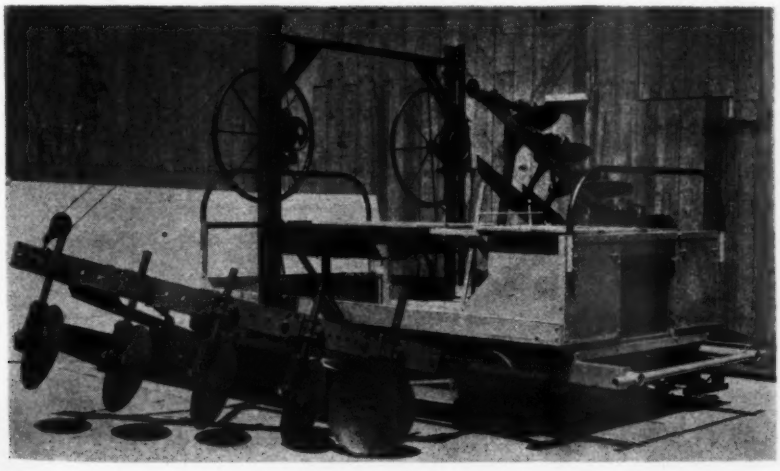
Ballast Discer

A NEW and more powerful model has been added to the line of medium-size track-mounted ballast discers produced by Fairmont Railway Motors, Inc., Fairmont, Minn. This unit, known as the W62 Series A, is designed for use in chat, cinder, gravel or similar ballast and is mounted on a self-propelled, 40-hp. carriage which has a four-speed transmission. A directional gear permits the four speeds to be used in either direction.

The discing equipment embodies a set of five 18-in. steel discs on each side. These are mounted on a welded-steel disc frame, the inner end of which is hinged to the carriage by means of a knuckle joint which allows the frame to float within limits and enables it to ride over most hidden obstructions. The discs revolve on tapered roller bearings and are mounted so that they may be turned or tilted to give any desired working effect. Large hand wheels, cable-connected to the supporting frame, control the cutting depth of each set of discs, and a hand brake is provided to hold each set in the desired position.

Protection against occasional derailments of the front end of the unit, due to the discs striking hidden objects, is supplied by a safety skid which is said to support the carriage when the wheels leave the rail and to prevent them from dropping onto the ties. Rerailing is then accomplished by raising the front end only an inch or two by means of extension lift handles provided for this purpose. A hand-operated hydraulic lift and turntable facilitate turning the unit or removing it from the track.

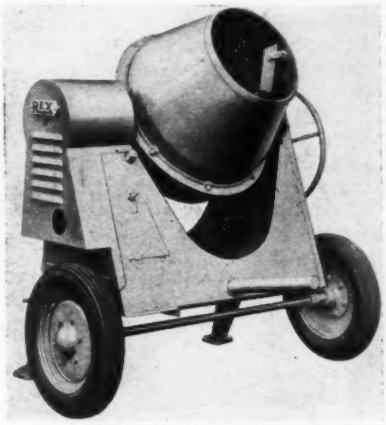
An operator and two helpers are required to handle the unit, which weighs 2100 lb. In the winter season, the discing equipment may be removed and the carriage used as a gang car.



The Fairmont W62 Series A Ballast Discing Machine

New Rex Mixer

THE Chain Belt Company, Milwaukee, Wis., announces the manufacture of a new end-discharge tilting mixer, known as the Rex 3½S. Mounted on two pneumatic-tired wheels, the new model is approximately 150 lb. lighter in weight than the former Rex mixer of similar size. The wheel-tread width of the new unit has been increased to 62 in. and the mixer body has been cradled between the wheels to obtain a lower center of gravity, a feature which is said to have advantages in faster and safer towing.



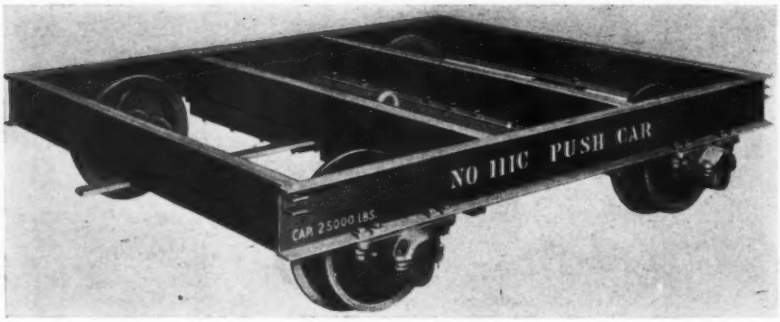
The New Rex 3½S Tilting Mixer

The drum of the mixer is of all-welded, pressed steel and is driven by a ring gear, said to be easily replaced when necessary. The tilting of the drum is controlled by a 24-in. hand wheel, equipped with a ratchet-type lock. Other features of the unit include a choice of two engine sizes, an enclosed roller-chain drive, cantilever springs and a removable pole for towing.

Heavy-Duty Push Car

DESIGNATED No. 111C, a new heavy-duty push car, with a load capacity of 25,000 lb., has been developed by Fairbanks, Morse & Co., Chicago. The new car is all-welded, steel-frame construction, utilizing seven-inch structural channels for the side sills and for the four cross sills, with the cross members butt-welded flush with the side sills. This construction is said to make the unit unusually strong and to eliminate the possibility of the cross sills being broken away from the side sills when heavy loads are placed on the car.

The car is equipped with a one-piece, through-type draw bar, bolted to the bottom of each cross sill, and



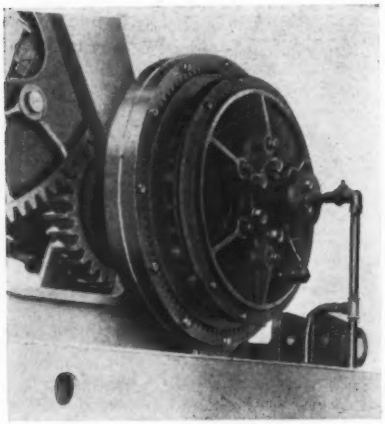
The Fairbanks, Morse 111C Heavy-Duty Push Car

with a center eye-bolt for use when lifting the car on and off the track. Stake pockets are located at the four corners.

The car has 16-in. cast-iron wheels with chilled treads, the wheels being loose-mounted on the axles. The axles are three inches in diameter and are fabricated from high-carbon, heat-treated steel. Plain babbitt bearings are used throughout. The overall length of the 111C push car is 95⅛ in. and its height is 17½ in. above the top of rail. It weighs about 1640 lb.

Air-Cushion Clutch

ALL excavators of one cubic yard capacity and larger manufactured by the Osgood Company, Marion, Ohio, are now equipped with a new type



The Osgood Air-Cushion Clutch

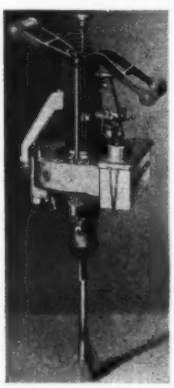
of clutch, known as the Osgood Air-Cushion clutch, for controlling the hoisting, crowding, steering, swinging and traveling mechanisms. This new development is said to overcome any possibility of the clutch being engaged too quickly, thereby causing the machine to jerk.

The new clutch is of the disc type and is engaged by admitting air under pressure into a circular tube or "doughnut" of rubber, which is confined between two plates, one of which is movable. Expansion of the tube, as air is admitted, causes the friction disc to be clamped between the floating plate and the back plate of the clutch, to complete the engagement. Air pressure in the "doughnut" can be controlled by the operator by means of metering valves, thereby, it is said, permitting the loads to be picked up as slowly or as quickly as desired. However, due to the volume of air required, it is said to be impossible for the operator to admit air fast enough to cause the machine to jerk.

The construction of the new clutch is claimed to eliminate all lever arms, pins, collars and other small parts and to preclude any lost motion developing as these parts become worn. The new clutch is said to require no adjustment because the wear of the disc is automatically compensated for by the expansion of the rubber tube.

Improved Tytamper

THE Barco Manufacturing Company, Chicago, has announced the Model K-3 Tytamper, a self-contained tamping machine, which is said to incorporate a number of improvements over its predecessor, the Model TT-3. In outward appearance the Model K-3 is similar to the TT-3, with the battery-ignition system and gasoline tank mounted on the Tytamper frame to eliminate the separate battery and connecting cables used in earlier Barco models. One of the principal improvements to be found in the K-3 is in its reduced weight. Weighing only 70 lb. with the tamping bar, it is approximately 9 lb. lighter than the TT-3.



The Barco K-3 Unit Tytamper

The new unit tamper is powered by a single-action, two-cycle engine in which the explosion of the gasoline charge in the combustion chamber drives the piston downward to strike a blow on an anvil which transmits it to the tamping bar. The piston is returned by the action of a spring. The engine is started by means of a push-rod starter located on the top of the cylinder.

Automatic Pump Control

AUTOMATIC Control Company, St. Paul, Minn., has introduced a new pump control unit, known as Protectrol, which is designed to prevent deep-well or centrifugal pumps from running for longer than a predetermined interval without discharging water. It is said that mechanical failure, lowering of the water table, or any other cause for water not being discharged will cause this unit to stop the pump and prevent it from restarting until the Protectrol unit has been reset manually.

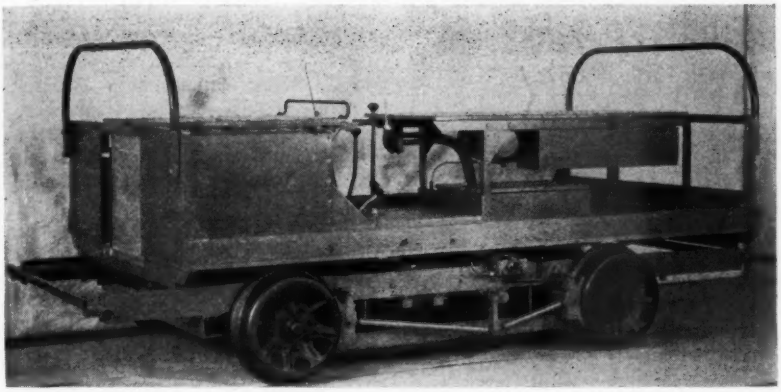
The unit is not designed as a primary control device, but is for use in conjunction with the primary controls, either automatic or manual. It is available in two types, one of which, known as Class I, includes an alarm and alarm silencing circuit, while the second type, Class II, has no provision for an alarm. The alarm system of the Class I Protectrol includes a warning lamp which lights whenever the unit stops the pump.

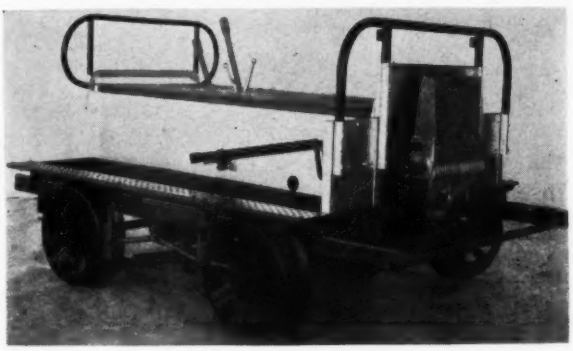
Fairmont Motor Cars

THE development of three new track motor cars—a heavy-duty gang car, a standard section car, and a light section car—has been announced by Fairmont Railway Motors, Inc., Fairmont, Minn. These new cars are said to incorporate all of the latest developments in motor-car design, resulting in improved performance, simplified maintenance and minimum weight.

The new gang car, known as the A7 Series A, is equipped with a four-cylinder engine, capable of developing 40 hp. at usable track speed (32 m.p.h.). It is driven through a dry-disc clutch and a four-speed transmission. An enclosed directional gear in the driving axle permits the use of the four speeds in either direction. The frame is of bolted-steel construction with front and rear extension-lift

(For additional information on any of the products described on this page, use postcards, page 221)





Above—The Fairmont A7 Series A Heavy-Duty Gang Car Has a Capacity for Seating 12 Men

The Standard Section Car, S2 Series H, Incorporates an Aluminum - Alloy Panel to enclose Engine and Drive

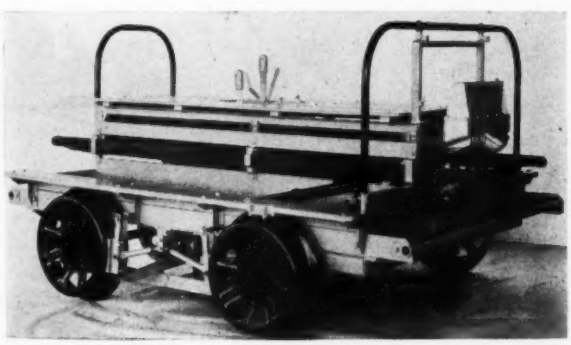
handles. To simplify setting off and turning the car, it is equipped with a built-in hydraulic lift and turntable, operated by a hand pump on the frame. Although it weighs 2,450 lb., a lift of only 580 lb. at the rear is said to be required when turning the car manually.

A 12-man seating capacity is said to make this unit well suited for use as a hump car. When it is equipped with hinged side steps, the total number of passengers may be increased to 22. Other features of this car include four-wheel, vacuum-operated brakes, a 62-in. wheel base, electric starting, and a load capacity of 3500 lb.

panels enclosing the engine and drive mechanisms. Wheel guards, step plates and tool trays are of steel plate fabricated in a safety-tread design.

The car is mounted on 16-in. demountable wheels with tapered roller bearings in box-type casings provided on each axle. The brakes are lever-controlled and are self-centered with renewable liners. Hickory extension-lift levers, with position stops, are provided at both the front and the rear of the car.

The new Fairmont light section car is also belt driven and is powered by a single-cylinder, two-cycle, reversible engine rated at 5 to 8 hp. Known as



The M14 Series H Light Section Car

The new standard section car, designated as the S2 Series H, is a belt-driven unit powered by a 13-hp. engine. The frame is of bolted steel construction with aluminum alloy

the M14 Series H, it weighs 810 lb. and seats six men. A rear lift of 112 lb., with the lifting handles extended, facilitates its use by as few as two men. The top seat is hinged at the rear so that it can be raised to give full access to the engine and drive, thereby facilitating inspection, cleaning and adjustments.

The engine cylinder head is of aluminum alloy and the engine incorporates a timing device, known as the Fairmont weather-sealed timer, which is said to provide positive ignition at all speeds in any weather. A battery ignition system, utilizing four dry cells, is used on this unit.

New Wayne Crane

A NEW four-wheel-drive, self-propelled crane adaptable for use as a power shovel, trench hoe, dragline or clamshell has been introduced by the American Steel Dredge Company, Inc., Ft. Wayne, Ind. Known as the Wayne Crane, it is mounted on a self-leveling chassis which permits operation on uneven ground. The new unit is said to be capable of traveling, booming and hoisting simultaneously. Other features incorporated in the new crane are a full-vision cab, enclosed oil-immersed gears, a 62-hp. gasoline-engine power unit, a wheel base of 7 ft. 8 in., and pneumatic tires.

The New Wayne Crane In Use As a Trench Hoe

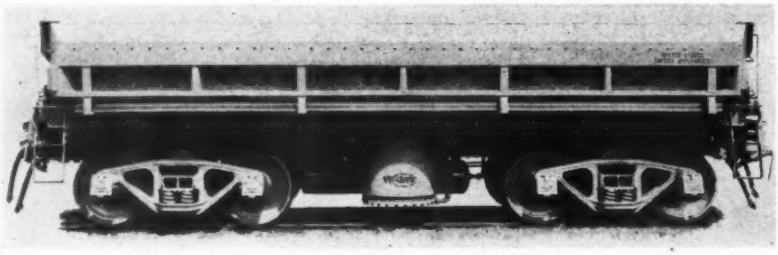
The cab revolves on a 48-in. ball race and no center pin is used. Two booms are available for adapting the unit for use with all of the attachments mentioned.

New Dump Car

THE Austin-Western Company, Aurora, Ill., has developed a new automatic air-dump car of 20 cu. yd. capacity, which is intended primarily for use in ditching service. The car is 23 ft. 6 in. long and is of the heavy-duty railroad type, with dual side pivots and drop doors. It is said that the car can be loaded to capacity quickly and efficiently because careful consideration was given in its design to the reach and loading ability of modern ditching equipment.

In dumping, the car floor assumes an angle of 50 deg. and material is

(For additional information on any of the products described on this page, use postcards, page 221)



The Austin-Western 20-Yd. Capacity Dump Car

said to be deposited well in the clear. When the car is in the dumped position, the drop door protects the track and ballast from the dumped material. It is claimed to include all of the features essential to standard railroad operation. Although the car is designed primarily for ditching work, its low weight, low center of gravity, stability in running and dumping, and quick-dumping feature, are said to make it suitable for all types of railroad service where the use of dump cars is indicated.

Vertical Motor for Pump Drives

A NEW hollow-shaft vertical motor, designed specifically for use in driving pumps, has been added to the line of Tri-Clad induction motors produced by the General Electric Company, Schenectady, N. Y. Available in ratings from 1 to 500 hp., and designed for use with a variety of speeds and frequencies, the new motor is said to be particularly suited for use with deep-well turbine pumps. The design of the motor is said to provide suitable starting torque and low starting current at full voltage.

Motors in the new line that are rated 10 hp. at 1800 r.p.m., and larger, feature a controlled lubrication system which is said to allow the proper amount of oil to flow through the bearings, thereby preventing oil-friction losses caused by foaming and churning. During standby periods, this system maintains an oil level above the tops of the bearings, thus preventing rusting.

The oil reservoir of the new motor is cast integral with the end shield, and is said to have sufficient capacity to allow the oil to cool and recover before being recirculated. Motors rated 7½-hp. or less at 1800 r.p.m., or smaller, have grease-lubricated bearings.

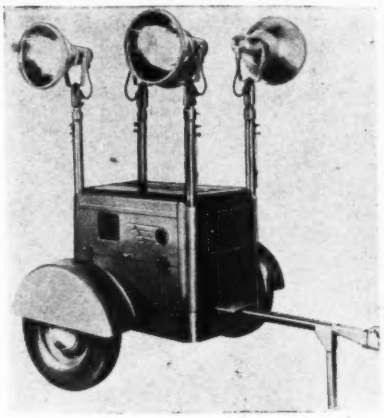
A double-end ventilation system, which draws in air at both ends of the motor and discharges it through openings in the stator frame, is said to provide effective cooling for the bearings, punchings and windings. A protective self-released coupling, consisting of a top half-coupling keyed to the pump shaft, and a lower half-coupling keyed to the motor shaft, prevents damage to the pump or motor in case of motor reversals, it is claimed. This feature is also said to reduce the time required for installation and to provide a simple method of checking the motor alinement. When impeller adjustments are required, one person can remove the top cap without the aid of rigging. It is claimed that the motor can be lined up accurately and easily from the top. Adjustment of the pump shaft is accomplished by means of a locking nut on top of the coupling.

One of the General Electric Hollow-Shaft Vertical Motors

Onan Floodlighter

THE Onan Commercial Floodlighter, a portable, independent light source, is now offered by D. W. Onan & Sons, Inc., 43 Royalston avenue, Minneapolis, Minn. This unit, mounted on a trailer, embodies an Onan 3,000-watt alternating-current electric plant and four 750-watt floodlights mounted on steel standards that may be raised to a height of seven feet. The floodlights may be rotated through 360 deg. horizontally and also may be moved through a wide vertical arc. Each floodlight is controlled by a separate toggle switch. A variety of floodlight combinations is available.

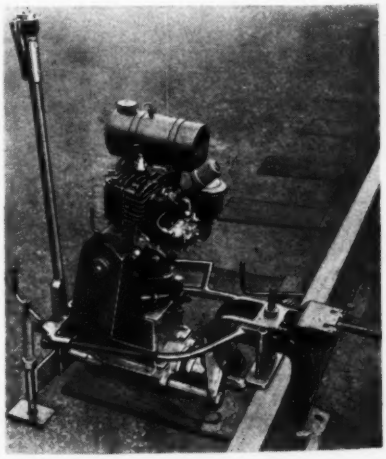
The electric generator is powered by a four-cycle, air-cooled gasoline engine which is said to give dependable performance, even in unfavorable weather. The engine has battery-powered, push-button starting, and the generator may be arranged for direct-current output for recharging the battery. The Onan Floodlighter is said to require only .183 gal. of fuel per kilowatt-hour when carrying full-rated loads.



The Onan Commercial Floodlighter

Power Rail Drill

THE Railway Track-Work Company, 3207 Kensington avenue, Philadelphia, Pa., has added a new portable power track drill to its line of track equipment, which is claimed to be capable of drilling a hole in less than a minute. Designated as Model P-34-A, this drill is 30 in. high, 20



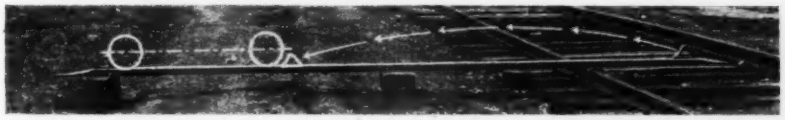
The Model P-34-A Portable Track Drill

(*For additional information on any of the products described on this page, use postcards, page* 221)

in. wide, 34 in. long, and weighs 143 lb. Power for driving the drill is supplied by a 1½-h.p. air-cooled gasoline engine through a guarded V-belt, countershaft, and gear-reduction unit. The engine and drill assembly are mounted on two parallel steel rods which are attached at one end to a clamp that fits over the track rail, and at the other, to two adjustable supporting columns.

Lateral travel for feeding the drill is accomplished by a hand lever acting on a rachet gear and rack, causing the entire power unit and drill to slide on the supporting rods. Adjustment of the bit to various rail heights is made by means of a small hand crank on a vertical screw through the rail clamp. The machine is leveled on uneven grounl by similar cranks in the adjustable supporting columns.

Other features claimed for the drill include an aluminum gear-reduction housing for light weight, ball bearings on all shafts, and a simple belt adjustment. A drill chuck for flat-beaded bits up to 1½ in. is supplied with the unit; but a chuck can be furnished for square or tapered-shank drills if desired.

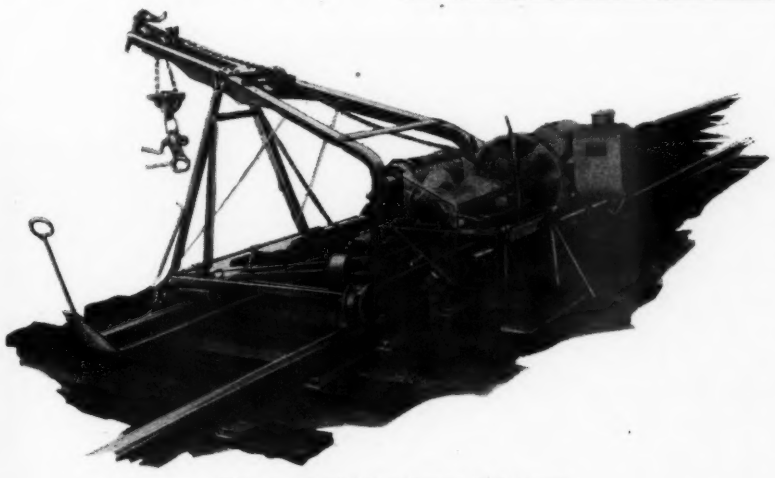


Above—Indicating the Position of the Rail Layer as It Is Mounting the Setoff
Below—Indicating the Position of the Rail Layer When Clear of Traffic on the Setoff

Improved Rail Layer

THE Maintenance Equipment Company, Chicago, has made several improvements in the Meco Power Rail Layer, among which is the application of a universal rail grip at the center of the machine. This grip is designed to engage the base of the rail upon which the rail layer is mounted so that the machine will function equally well on standard T-rails or on Headfree rails. The universal rail grip is said to be interchangeable with the rail grips formerly used on these units and may be applied to Power Rail Layers already in use.

Another improvement is the provision of a setoff and transfer as auxiliary equipment for the rail layer to facilitate removing the unit from the track or transferring it to the opposite rail or to an adjacent track, provided the track centers in the latter case do not exceed 14 ft. With the setoff, four men are said to be able to handle the machine easily, a task which formerly required a full gang using lifting handles. Hangers are provided beneath the rail layer to carry the parts of the setoff and transfer.



The Improved Meco Power Rail Layer

Duff-Norton 50-Ton Screw Jack

THE Duff-Norton Manufacturing Company, Pittsburgh, Pa., has developed a new general-purpose screw jack, with a capacity of 50 tons, which, it is said, can be operated at full speed by one man. This new jack, known as Model 5024-W, has a raise of 14⅜ in. It is currently being tested in heavy construction work, bridge and building operations, and in railroad shop service and is said to be giving results in these applications that are exceptionally efficient.

One-man operation is obtained through the use of a high-ratio, alloy-steel worm and a special bronze worm gear. Another feature of the new jack is its inverted design, with the operating mechanism at the base, which incorporates a cast alloy-steel foot lift capable of lifting 25-ton loads from a low height of 3-5/16 in.

The Duff-Norton 50-Ton General-Purpose Screw Jack

The base of the jack is of large diameter to provide a stable non-tipping foundation, and the housing is of rib-reinforced malleable iron. Complete information on the 5024-W jack is contained in Duff-Norton Catalog No. 303, which illustrates and describes in detail the company's complete line of jacks.

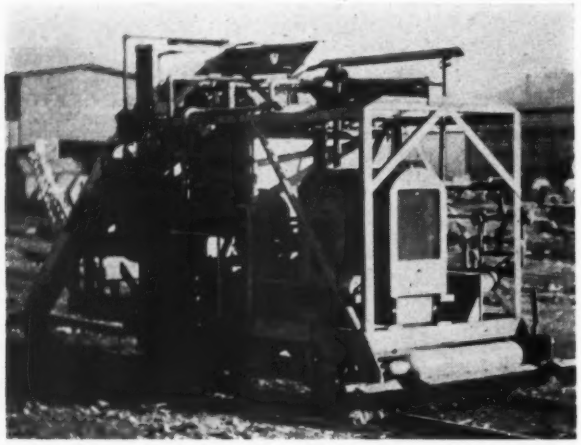
Crib-Cleaning Machine

THE development of a machine for removing foul ballast from the space between the ties, separating the dirt from the ballast, returning the clean stone to the crib and disposing of the dirt, is announced by the Railway Maintenance Corporation, Pittsburgh, Pa. An experimental model of this machine was placed in service last year

(For additional information on any of the products described on this page, use postcards, page 221)

and the results of its operation are said to have been highly satisfactory.

The machine consists of an on-track, self-propelled carriage, equipped with lifting jacks and set-off wheels, weighing approximately 18,000 lb. A hydraulically-operated ram on each side of the machine is arranged so as to operate in the cribs, moving from the ends of the ties toward the center of the track. By means of the rams the crib ballast is forced to the center of the track where it is picked up by an endless digging-type conveyor which delivers it to a screen for separating the dirt from the stone. After cleaning, the stone is returned to the track and the dirt is delivered onto a swing conveyor, which deposits it at the side of the right of way or into a following car, as desired. In operation, the machine is said to have a capacity for cleaning two cribs per minute.



The New Crib-Cleaning Machine Maufactured by the Railway Maintenance Corporation

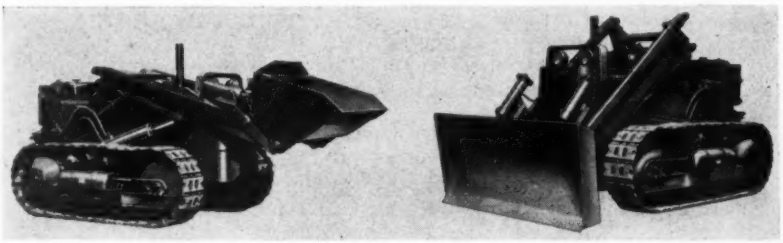
The machine is powered by a 70-hp. gasoline or Diesel engine which drives the hydraulic pumps and, through mechanical means, the digging conveyors. The machine is propelled by means of a hydraulic motor and is said to be capable of speeds up to 15 m.p.h.

Bulldozer-Shovel

THE development of a new bulldozer-shovel, known as Model 9-A, has been announced by the Franklin G. Hough Company, Libertyville, Ill. Specifically built for application to the International P-9 and PD-9 TracTracTors, the Model 9-A is a dual-purpose unit which may be equipped with either a full track-width one-cubic yard bucket or a bulldozer blade. Because this unit is specifically designed for these tractors, the original balance, stability and traction of the tractors are said to be maintained with either the bulldozer blade or the bucket operating.

All movements of the bucket are controlled by hydraulic means which eliminate practically all physical effort on the part of the operator. Spillage of the load is prevented by an automatic feature which tilts the bucket back into a carrying position. The design of the unit permits a long or high dumping reach to facilitate discharging the bucket load, while a unique design of the push arms is said to provide a powerful action in digging and a fast hoisting action.

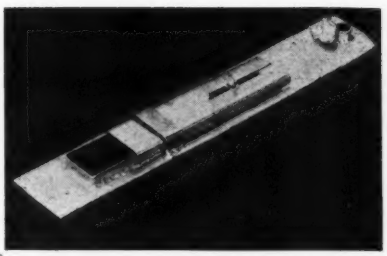
All overhead and side structures were eliminated in the design of Model 9-A to afford full 360-deg. visibility for the operator. Complete mechanical details and specifications of the new model are available in catalog No. 164 which may be obtained from the manufacturer.



The Hough Model 9-A Bulldozer-Shovel. The Unit Shown at the Left Is Equipped With the One-Cubic Yard Bucket, While That at the Right Is Fitted With a Bulldozer Blade

Switch Heaters

YOUNG & Greenawalt Co., East Chicago, Ind., has developed an oil-burning, pot-type switch heater, known as the Wye-Gee Switch Heater, which is said to be capable of burning for 10 hours at full heat without attention. The Wye-Gee is 9¼ in. wide and 33 in. long and is only 4½ in. deep. Because of its shallow depth it is said that the heater may be installed with a minimum of excavation. These heaters are fabricated of No. 8-gage steel plate, are said to be able to resist blows of picks or bars, and are of all-welded construction. A large burner is provided to assure an adequate flame for melting snow.



The Wye-Gee Switch Heater

Locomotive Crane

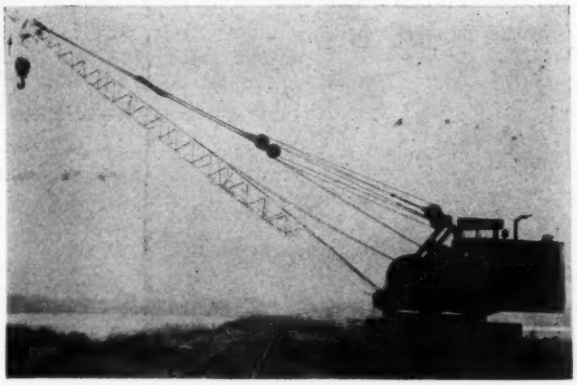
THE recent development of a locomotive crane of 40-tons free capacity and 80-tons outrigger capacity, which can be powered with either a Diesel-mechanical or a Diesel-electric drive, as desired, is announced by the Industrial Brownhoist Corporation, Bay City, Mich.

When operating as a free unit, this crane is reported to have a maximum traveling speed of 20 m.p.h., and may be used for all types of lifting service, such as grab-bucket work, scrap-handling service, magnet lifting, and a variety of other uses. When outriggers are employed, its uses include the erection of steel in bridge and building work, the rerailing of cars, other emergency service within its capacity, and other heavy work.

The crane is equipped with a patented Universal-type boom head which incorporates an integral offset extension, arranged in such a manner that sheaves may be added or removed as desired. This arrangement of the boom head is said to give maximum head room when hoisting loads at a short radius. The crane is equipped with a monitor-type cab which is said

(For additional information on any of the products described on this page, use postcards, page 221)

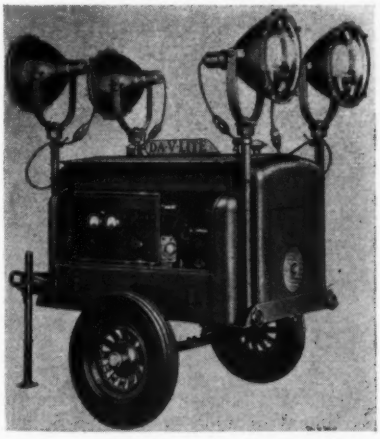
to afford the operator a 360-deg. range of vision. It is mounted on a heavy-duty car body, equipped with 6½-in. by 12-in. AAR trucks. Anti-friction bearings are used in all essential places, including the hoist drums and the boom-tip sheaves. A safety clearance of 14 in. is provided between the car body and the revolving upper works of the machine.



The Brownhoist 40-Ton Locomotive Crane

Portable Power Unit

FOUR models of a portable power and lighting unit, suitable for night illumination, during emergency work and for providing emergency power wherever needed, are now being produced by the Davey Compressor Company, Kent, Ohio. Designated as the Da-V-Lite, this unit is built around a 5,000-watt Westinghouse self-excited, self-regulated alternating-current generator, driven by a 15-hp. Wisconsin air-cooled engine.



The Da-V-Lite Searchlight Model

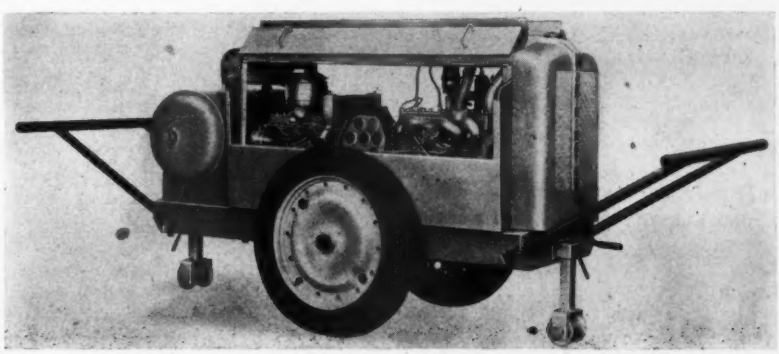
The power units are available as floodlight, searchlight, combination, and beacon models, each designed for special applications. The floodlight model is equipped with four Westinghouse 16-in. floodlights, providing 185,000 candle-power per light and is suitable for work-lighting large areas. The searchlight model is designed for spotlighting more restricted areas, nearby or at a distance, and this unit is equipped with two 18-in. searchlights. The combination model is equipped with two 16-in. floodlights and two 18-in. searchlights and can be used for work lighting or spotlighting as desired. The beacon model, for special directional lighting work, has one 24-in. searchlight.

These units are furnished on skids or on two-wheel, spring-mounted trailers. The trailer machine, which weighs 1,750 lbs., is 9 ft. long, 7 ft. 6 in. high, and 5 ft. wide. The Da-V-Lite units are also being distributed by the Westinghouse Electric Supply Company.

Blue Brute Compressor

AN improved model of the Blue Brute 60-cu. ft. Hand-I-Air portable compressor unit is announced by the Worthington Pump & Machinery Corp., Harrison, N. J. Although incorporating the basic features of the earlier model, the new Hand-I-Air features a reduction in weight of 400 lb.

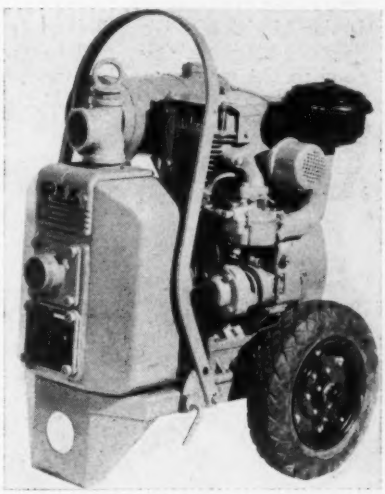
The unit is mounted on 6.00-by-16 pneumatic tires and is said to be exceptionally easy to handle into position. The side curtains of the machine are hinged permanently for greater convenience, and tool-box space has been provided for carrying necessary accessories. A "fuel saver" control, which is said to rate the compressor to the load, has been included for the purpose of assuring maximum economy of operation.



The Worthington Blue Brute 60-Cu. Ft. Hand-I-Air Compressor

Rex Self-Priming Centrifugal Pump

THE production of a new line of Rex self-priming centrifugal pumps with press-formed bodies is announced by the Chain Belt Company, Milwaukee, Wis. The pump bodies are made of Armco Ingot Iron, said to be highly resistant to corrosion, and the use of this material has resulted in a considerable saving in weight, compared with former Rex pumps which were constructed largely of cast iron. The 2-in. size in the new line, for example, is said to



One of the Rex Press-Formed Self-Priming Centrifugal Pumps

(For additional information on any of the products described on this page, use postcards, page 221)

weigh approximately 90 lb. less than the earlier 2-in. model.

The press-formed pump bodies are said to be capable of resisting cracking or shattering under heavy loads or in freezing weather. Other advantages claimed for the new pumps are improved priming and greater efficiency, due in part to the press-formed volutes, which are said to result in a smoother flow of water because of reduced friction.

Low-Pressure Spray Gun

THE Eclipse Air Brush Company, 426 Park avenue, Newark, N.J., has developed a new low-pressure spray gun designed for finishing operations where the materials are relatively light, and a limited volume and pressure of air are available. The Eclipse Junior Model 46, as it is known, is a lightweight gun that is said to give good results with a very low air consumption. Internal and external types of nozzles can be used with the

Eclipse Junior Model 46 Lightweight Spray Gun

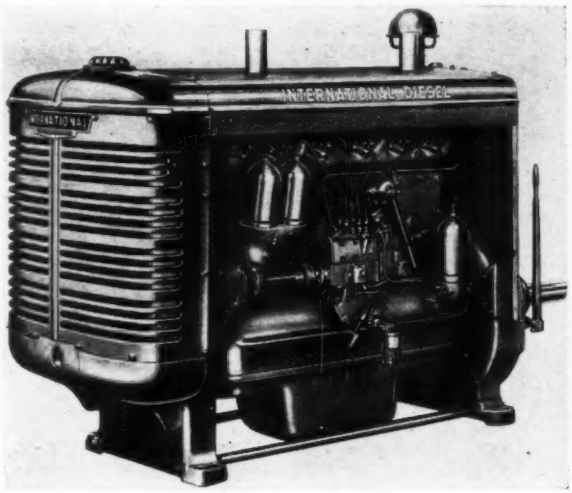
gun. The spray pattern with the external nozzle, it is claimed, can be changed from a cone to a fan by simply adjusting the air valve on the back of the gun. Both the fluid and air connections are comprised of standard ¼-in. pipe.

Diesel Power Units

THE Industrial Power division of International Harvester Company, Chicago, has announced the production of two new Diesel power units, one with four cylinders and the other with six, which are rated at 76 hp. and 125 hp., respectively. Known as models UD-14A and UD-18A, these units are applicable to a variety of equipment combinations, and are said to have relatively high compression and efficiency, and increased power output without increase in weight. These characteristics are attributed in part to a new cylinder-head arrangement, and to improved nozzles and redesigned combustion chambers.

According to the manufacturer, special lubricating oils are not required for these engines because of the cooling and combustion characteristics. A new type oil-control ring is said to assure satisfactory cylinder lubrication wtihout excessive oil consumption.

Both of the new models are equipped with integral, gasoline starting systems which function in the same manner as ordinary gasoline engines. After a brief, direct-flame cylinder warm-up, the movement of a single lever changes the engine from the gasoline starting cycle to four-cycle Diesel operation with compression ignition.

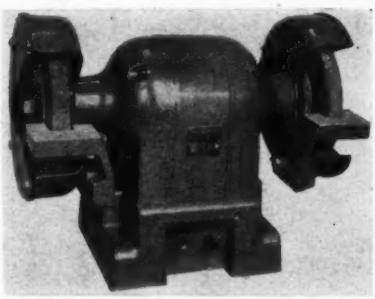


The International Harvester UD-18A Diesel Engine

Heavy-Duty Bench Grinder

A NEW six-inch heavy-duty bench grinder, for use in grinding, tool sharpening, wire brushing, and buffing, is now offered by the Black & Decker Manufacturing Co., Towson, Md. This unit is equipped with two grinding wheels, one of medium grade for rough work, and one of fine grade for finish grinding and tool sharpening. The grinder is mounted in a die-cast, zinc housing which can be bolted to a bench or mounted on a matching pedestal that can be located anywhere in the shop. It is controlled by a two-button switch, recessed into the grinder housing to prevent accidental contact.

Steel wheel guards, said to meet all safety requirements, are provided, these being wide enough to accommodate a standard three-section wire brush. Improved support for tool-



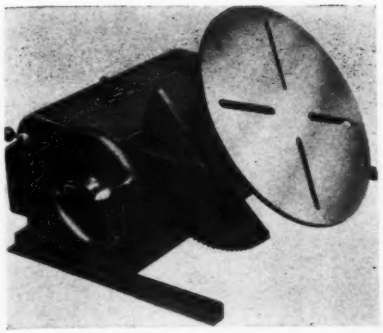
The New Black & Decker Heavy-Duty Bench Grinder

sharpening work is provided by a U-shaped tool rest which fits around each grinding wheel. A machined hole is provided on the face of the grinder base for mounting the attachments commonly used on these grinders.

Bench Positioner

A POWER-operated bench-model positioner suitable for use with work weighing 100 lb. or less in shops and laboratories is now being produced by the Industrial division, Ransome Machinery Company, Dunellen, N. J., a subsidiary of Worthington Pump & Machinery Corp. Built to handle small units, the positioner, known as Model 1-P, is said to be a versatile machine which facilitates welding, assembling, repairing, and similar operations by helping to position the work to the best advantage of the operator. The platform or turntable on which the

(For additional information on any of the products described on this page, use postcards, page 221)

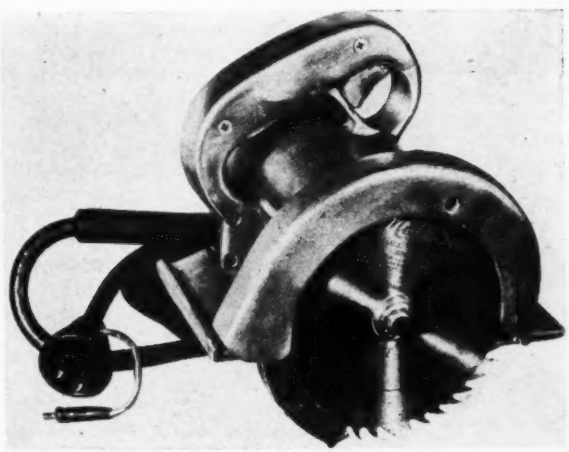


The Ransome Model 1-P Positioner

work is mounted may be tilted to 135 deg. and can be locked in position at any degree of tilt. The turntable may be revolved through 360 deg. freely or by means of a ⅛-hp. single-phase reversible motor. When motor-driven, a lever-operated variable-speed pulley drive permits turning the platform at rates up to 5 r.p.m.

Lightweight Power Saw

A NEW six-inch, portable electric hand saw, known as the Model 60 Mallsaw, is now offered by the Mall Tool Company, 7740 South Chicago avenue, Chicago 19. This unit, which weighs but 8¾ lb., is capable of cutting through rough dressed lumber up to two inches in thickness. It is said to be well suited for all types of light carpentry work and, in addition, can be equipped with a Mall abrasive disc for grooving out mortar joints, for tuck pointing, or for scoring limestone, tile, concrete and other aggregate compositions. The Model 60 Mallsaw may be obtained with a 110-volt or a 220-volt motor, suitable for use with alternating current or direct current, as desired. The saw has an aluminum die casting housing which not only minimizes the weight, making the saw easier to handle, but which is said to give it better balance for use in either hand.

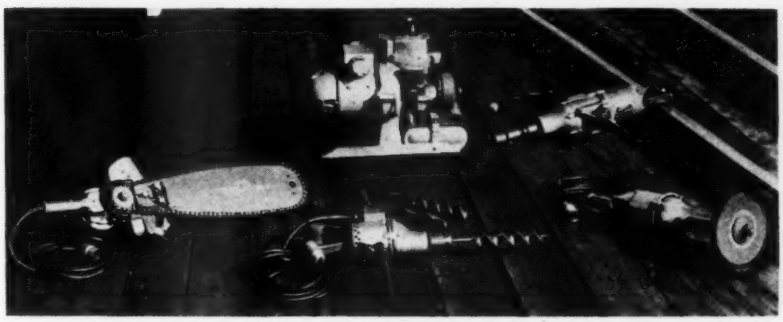


The Model 60 Mallsaw

High-Cycle Generators

THE HOMELITE Corporation, Port Chester, N. Y., is now producing two gasoline-powered, 180-cycle portable electric generators for use with high-cycle electric tools such as grinders, drills, nut runners, and chain saws. The new generators include a single-cylinder 2500-watt unit and also a two-cylinder 5,000-watt machine.

The 2500-watt generator, which has an output of 230 volts, weighs 129 lb. complete with the gasoline engine. It is pointed out that the development of these units permits high-cycle tools, heretofore largely confined to use in shops, to be used at outlying points in maintenance and construction work.

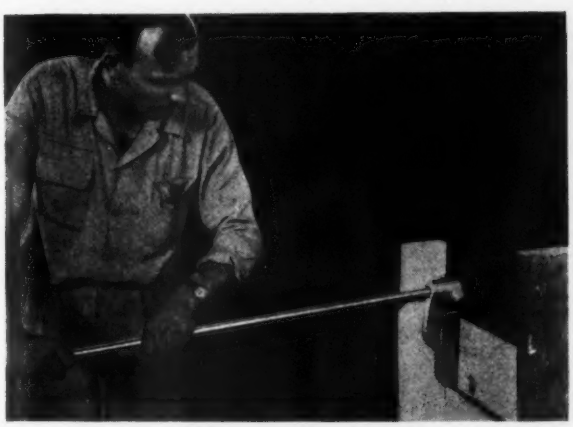


One of the Homelite High-Cycle Generator Units and Some of the Tools that Can Be Used With It, Including a Nut Runner, a Track Grinder, a Reversible Drill and a One-Man Chain Saw

Lumber Reclamation Tool

REMARKABLE success in the split-free removal of sheathing, siding, flooring and other lumber, when razing old buildings, is said to result from the use of a new tool, known as the Bord-Pri, manufactured by the Maco Corporation, Huntington, Ind. This tool is said to lift flooring, siding, roofing and other wood with such care that cracks, splits or breaks are prevented. Not only does the Bord-Pri take off ordinary planking, but it is also said to remove tongue-and-groove flooring or shiplap siding with ease and without damage.

The Bord-Pri operates on the lever principle and embodies lugs which bear against adjacent studding to act as a fulcrum, and a pivoted face plate which is applied against the board to be removed. This arrangement is said to provide equal distribution of pressure against the board.



Showing How the Bord-Pri is Used to Reclaim Lumber

(For additional information on any of the products described on this page, use postcards, page 221)

What's the ANSWER?

Driving Piles Without Leads

Is it practicable to drive piles without the use of pile-driver leads? If so, how can it be done? Under what circumstances is this desirable? What are its limitations?

Leads Often Unnecessary

By A. A. Visintainer
Assistant Engineer of Structures, Erie, Cleveland, Ohio

Driving piles without the use of pile-driver leads is not only practicable, but must be done in a great many cases where leads, either fixed or hanging, cannot be utilized. A pile-driving machine equipped with a set of fixed leads is restricted in reach ahead, or to one side, of the machine. In general, this distance is 16 ft. or less, and thus restricts the spacing of pile bents when constructing a permanent or temporary structure to support railroad tracks, except in the case of a structure being built on existing track alinement.

Piles can be driven without leads and kept in good alinement by preboring a starting hole in the ground and attaching guys near the top of the pile. Another method that may be employed is to construct a template on the ground of sufficient height to support and guide the piles. A combination of template and guys can also be used to good advantage.

The construction of detour trestles outside the limits that can be reached from existing tracks must be carried on ahead of the pile driver if "on-track" equipment is to be used. In such cases, especially in grade crossing eliminations, it is desirable to provide spans as long as possible for clear roadways, etc. And in order to do this, the piles must be driven without the use of fixed leads. Other cases where fixed, and often hanging, leads cannot be used, include the driving of steel sheet piling in front of existing abutments, and the driving of piles outside of truss spans or deep through-girder spans.

Driving without leads also has a distinct advantage when the pile driver is to be used as a crane to handle the spans in the structure being built, since the actual time of driving is relatively short compared with the time required to take down and reassemble the fixed leads. In emergency work, driving without fixed leads permits the driving of piles for several spans, up to the limit of reach of the boom on the machine, before placing the spans. This results in speeding up the work due to elimination of delays in changing from pile driving to erecting. It is also desirable to forego the use of leads when driving piles in excavations where the tops of the piles will be below the level on which the pile driver is supported, since the leads would have to be extended after driving has reached a certain point.

On this railroad we have recently completed a 420-ft. steel trestle across a river, using spans of 36 ft., supported on double, three-pile bents. Piles are "H" sections, and a combination pick-up and pile-guide device was developed to handle the piles. This device was attached to the hammer, and provided a means of keeping the hammer centered directly over the pile so that the blow was entirely axial. The device also made it possible to have a loose hammer line so that the full weight of the hammer was carried by the pile. A floating template, securely anchored in correct position, was used to space the piles in the bents, and keep them in line. A ring attached to the pick-up device permitted the use of guy cables, operated by small air hoists, as a further help in keeping the piles in line while they were being driven. The results

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered In May

1. *When the number of ties per rail length is to be increased, either because of a change in standards, or by reason of a change in the classification of the track, what is the most satisfactory method of effecting the change?*
2. *To what extent should old, small and moderate-size stations be modernized? What factors should be considered? Should the work be left solely to local building forces? If so, why?*
3. *How should portable snow fences be stored when not in use? Can they be left in place? What are the relative advantages? The disadvantages?*
4. *To what extent can welding be used in the repair and strengthening of existing bridges? What are its advantages? What are its limitations?*
5. *What, if any limitations should be put on the use of spring frogs on curves? On tangents? Does the degree of the curve, the weight of rail, the amount or direction of traffic make any difference? Why?*
6. *In what ways and to what extent does Dieselization of high-speed trains effect the quantity and quality of water supplies? The type of pumping and station equipment?*
7. *Should second-hand rail that has been removed from tangent track be turned when it is relaid? Why? Does cropping make any difference? Why?*
8. *Is there any advantage in equipping regular bridge and building gangs with concrete mixers? If so, of what capacity? What type mounting? If not, how can the necessary concrete work on small jobs be done?*

obtained were very satisfactory and could not have been achieved as well if hanging leads had been used.

Driving piles without leads is of no advantage when the piles are driven directly in front of and within the limits of the reach of the machine. The function of the leads is to support the hammer and to have the load of the hammer rest directly on top of the pile. When leads are not used, an expert operator is required, since he must be skilled in handling the hammer line in order to lower the hammer at approximately the same rate at which the pile penetrates the ground. This is certainly no job for the unskilled operator, and men should be trained to handle the hammer without leads, in view of the many times that it is necessary to drive piles in this manner.

Batter Piles Need Leads

By L. G. Byrd
Supervisor, Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

It is the general practice to drive concrete piles without the use of leads, especially when they are driven without batter. One method of doing this is to bore holes in the ground the diameter of the piles, and to place collars at the ground line when the bridge is low, and in addition, near the top of the deck of high bridges. The opening of the collar for each pile should be approximately one inch larger than the diameter of the pile. The pile is then picked up, set in the hole bored at the required location, and the hammer placed on top of the pile. A special hood projects downward about six inches to hold the hammer directly on top of the pile.

This method can be used to drive piles up to 24 in. in diameter. If it is necessary to drive piles for a curved trestle, in which case the outside piles would have to be battered, it would be more economical to use leads, in addition to the collars, to hold the piles in place; or guy lines could be placed on the hammer to hold it in line while the piles are being driven.

It is possible to drive timber piles in this same manner, but it is seldom economical. As a rule, all timber trestles requiring from four to six bents also require from ½-in. to 3-in. batter per foot. Any battered pile, as stated before, is difficult to drive without leads. Furthermore, timber piles are not straight, many having both long and short bends and knots which could not be guided through collars without giving some trouble. In such cases, leads are a help. Regardless of what method of driving is used, holes should be bored from four to ten feet deep to prove there are no underground obstructions that might cause the piles to be driven out of plane with the bent. It should be remembered that, even when leads are required, it is not necessary to have what are called "stiff" leads, as the piles can be held in place by the use of guy lines as is done when off-track equipment is used.

Frog Guard Rail Height

Should guard rails of the same, lower or greater height than the running rail be used on sharp turnouts? Why? If higher or lower, how much?

Should be Same Height

By C. T. Jackson
Assistant Chief Engineer, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Our experience with high guard rails has been limited to their installations at not more than a half dozen turnouts where the curvature is about 16 deg. Main-line turnouts are not, as a rule, less than No. 9, and we have found that a guard rail at the same height as the running rail is all that is required. In a few cases we have ladder tracks in freight yards where No. 7 1/7 turnouts are used. At most of these locations we use standard guard rails which are the same height as the running rail. We have used some self-guarded frogs.

It is my opinion that standard guard rails are to be preferred at most locations, and that where special conditions require any different type of construction, self-guarded frogs are preferable to high guard rails.

High Guard Rails Effective

By T. H. Beebe
Chief Draftsman, Chicago & North Western, Chicago

Guard rails up to a maximum height of ¾ in. above the running rail will be considerably more effective than guard rails which are the same height as the running rail. Frequently, owing to the excessive pressure of wheel flanges against the outer rail of a sharp curve, the pony or trailer trucks, and at times the drivers of locomotives with long, rigid wheel bases, will rise a sufficient amount to climb a guard rail which is the same height as the running rail. Derailments of this kind can be prevented, or their number reduced in a great many instances, by the use of higher guard rails. Conversely, guard rails that are lower than the running rail will not provide adequate protection.

The sole function of a guard rail is to guide the wheels past the point and throat of the frog. To perform its proper function, a guard rail must be installed to the correct guarding-face gage. At sharp turnouts receiving heavy traffic, frequent adjustments are necessary to maintain this gage.

At such locations, especially in terminals and yards, several railroads use self-guarded frogs. The guards are cast integral with the frog, so as to engage the back of the wheels. Being 1¼ in. high, they give full protection to the point, regardless of minor variations in the gage of track. These self-guarded frogs eliminate the use of guard rails and prevent derailments in sharp turnouts.

Uses Higher Guard Rails

By H. C. Koch
Roadmaster, Belt Railway of Chicago

The use of heavy engines with long wheel bases in territories having sharp turnouts often causes trouble, because the drivers have a tendency to climb the guard rail on the turnout side. The same trouble prevails when car trucks are stiff.

Wherever practicable, turnouts sharp enough to give this sort of trouble should be renewed with higher numbered frogs. Where physical conditions do not permit the easing of curvature in this manner, our experience has proven that using a guard rail on the turnout side that is higher than the running rail helps to keep wheels from climbing.

We do not have any engines with blind drivers, and in territory where foreign power without such drivers is used, we have installed with good results guard rails that are one inch above the running rail. The turnouts are laid with 80-lb. A.S.C.E. rail which has a height of 5-in., and the guard rails were constructed by railroad welders from 100-lb. A.R.A.A. rail having a 6-in. height. I believe this difference in height could be increased a little, but if these special guard rails are made by company

welders it is both practical and economical to use a rail section which is standard on the railroad but of greater height than the running rail through the turnouts involved.

Same Height Preferred

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

Guard rails that are the same height as the running rail are better than any other size for holding the flanges of all wheels contacting them, because the backs of the flanges of all wheels, whether new or worn, will be vertical at the point of contact.

If the guard rail is lower than the running rail, the curved section of the back of the flange may contact the top corner of the guard rail and allow the opposite flange to wear against the gage side of the frog point. If the curvature of the turnout is quite sharp it is possible for the inner flange to climb to the top of the guard rail.

The observation of this action may indicate that an increase in the height of the guard rail above that of the running rail would prevent it, but if this is done, undesirable conditions are produced. The high guard rail contacts the back of the flange for a considerable distance above the tread of the wheel, and may produce sufficient friction to cause the wheel to rise above the running rail. This would increase the circumference of the rolling contact of the inner wheel on the guard rail to a point where it would be greater than the circumference of the wheel rolling on the frog. This is undesirable, and may even cause a derailment.

My belief is that guard rails on all turnouts should be the same height as the running rail. The guarding face of the guard rail must be kept normal to the plane of the track to prevent the back of a flange from riding up on the guard rail. Manganese steel resists the wear that might bevel the guarding face out of normal.

Freighthouse Floors

From the standpoints of economy, ease of maintenance, length of service life and suitability for trucking, what are the relative merits of various materials used for freighthouse floors? What other factors are involved?

Prefers Dense Concrete

By W. A. Huckstep
General Building Supervisor, Missouri Pacific, St. Louis

For a number of years many railroads have been seeking ideal flooring material for freight warehouses, and recent contacts with some large western railroads indicate that the search is still going on.

Quite a few manufacturers of flooring material and patented floor-surfacing material claim wearing qualities and other special advantages for their products which, if sustained by actual experience, should result in their being widely used. In those cases where the writer has checked with the users of such materials he has been advised that they have been used experimentally, and that so far no definite conclusions have been reached that they had proved or might prove more satisfactory than other materials.

Limited experimentation with center-matched and sized pecan flooring, applied several years ago over a sub-floor of heavy planking, has shown better results than other types of hardwood-surface flooring material previously used. The U.S. Government has conducted tests in the use of this material, and data, it is believed, can be obtained from the U. S. Forest Products Laboratory, Madison, Wis.

Another type of flooring that has proved satisfactory under certain conditions is yellow pine block flooring, sawed across the grain, with the blocks keyed together for application in sections. The ends of the grains of these wood blocks compose the wearing surface. This type flooring is pre-treated with paraffin by the manufacturers. To obtain good results it should be applied over a concrete slap, or other suitable sub-floor, and embedded in hot asphalt. It should never be used where it may be subjected to water overflow or continuous excessive moisture.

For heavy-duty freight warehouse floors and freight platforms, particularly where motorized warehouse trucks with trains of floats are operated, the writer's preference is for the use of heavy floor slabs of plain, dense concrete with trap rock aggregate, on a sand fill, with moulded expansion material interposed between edges of the floor slab and all abutting walls and columns. Dense concrete floor slabs, from 7 to 9 in. thick, were used to replace worn-out wood floors in machine shops and other shop buildings, even prior to our entry into the recent world war, due to the inability to obtain suitable wood flooring. The results secured from such floors have been quite satisfactory.

It may be that some manufacturers have developed materials that are ideal for heavy-duty freighthouse floors; at least some are costly enough that they should prove to be. But as long as cheaper types of materials are being produced which may give satisfactory results, expensive material is not likely to be employed to any great extent.

Each Type Has Advantages

By A. L. Sparks
Architect, Missouri-Kansas-Texas, St. Louis, Mo.

Many years ago the majority of experienced men would probably have said that tongue-and-groove, clear, select maple flooring was the most satisfactory of all floors for freighthouses. At some locations it may still be, but in earlier years when this type flooring was making its service record, most freighthouse floors were laid on wood joists with considerable air space beneath. Now, that passing years have brought a continuously increasing amount of heavy commodities moving through our freight rooms, larger load-bearing capacities are necessary, and the important warerooms have floors laid on solid earth fills with no air space between them. During periods of sudden changes in temperature, wooden floors are subject to sweating, which causes quick decay of the wood. The absence of air also causes dry rot, swelling and buckling of the boards.

The use of concrete-slab floors started with the advent of the filled-earth support, but steel-tired trucks cause such excessive wear of plain concrete floors that they do not retain satisfactory trucking surfaces for as long a period as good maple. To overcome this, concrete-hardening processes were introduced to make the floors wear longer. Such floors, however, sometimes became slippery to an objectionable degree, with the result that another admixture was added to make the floor slip-proof. But when rubber-tired wheels are used, concrete floors have great merit, with the one objection that they, too, sweat when laid on solid fills.

Where steel-tired trucks are used, concrete wears unevenly at construction joints, regardless of surface hardening. This fault is frequently overcome by the application of an asphalt mastic surface that does not fracture

and which wears off slowly. It does, however, become indented and gouged out by heavy, sharp objects, and it also sweats to the extent that it sometimes becomes necessary to provide racks or pallets on which to stack absorbent materials. Floors of this type are quite satisfactory when constructed over a basement or other ventilated space.

Treated wood blocks of the best quality, laid by skilled workmen, provide a splendid floor. To get the best results the blocks must be laid on a smooth, clean, dry concrete surface, with consideration given to bond and expansion. Unseasoned or imperfect blocks, or even good blocks laid by unskilled men, generally make a poor trucking surface.

This type floor will withstand greater punishment than any other, will last longer, is easily maintained, but has a higher installation cost than the others. The asphalt mastic floor ranks second in first cost, and is the next least expensive to maintain. The concrete floor is least expensive to build, but is hard to maintain in good trucking condition. The maple floor is the second most expensive to maintain, and its first cost is so variable at the present time as to be unpredictable.

Likes Asphalt Coverings

By James J. Healy
Assistant Supervisor of Bridges and Buildings, Boston & Maine, Boston, Mass.

Freighthouses can generally be divided into three classes: (1) The small suburban structure which is used for the storage and distribution of l.c.l. merchandise; (2) the urban freighthouse with one or more tracks, handling carload lots as well as l.c.l. freight; and (3) the large city terminal, with transfer platforms and modern material handling facilities.

Floors in the first type building are generally made of wood plank, three to four inches thick, and present no special problem in maintenance. Freighthouses in the second class usually have double-thickness plank floors which, in past years, have been satisfactory for hand trucking. However, the introduction of tractors and trailers at some of the larger stations to facilitate the handling of freight has required a smoother floor surface. To provide this, it is recommended that the top plank be removed in the traveled aisles, and a commercial asphalt plank of equivalent thickness substituted for it. Experience has shown that maintenance costs can be lowered to an irreducible minimum by laying this material according to the manufacturer's specifications in heavily traveled aisles, which have a solid sub-floor that is adequately spiked to its supports.

In many freight terminals, floors constructed of dense concrete on solid foundations have given satisfactory service, and have required little maintenance. When small areas are damaged occasionally, they may be repaired with only slight interference to traffic by patching with quick-setting concrete.

Wood floors on timber foundations are the most expensive to maintain and have the disadvantage that repairs usually slow up the movement of freight. The application of asphalt plank to the traffic aisles and transfer platforms, over wood floors, has practically elliminated maintenance and traffic tie-ups due to repairs.

The main floor-sections of some terminals have been constructed with 3-in. sub-floors and 1-in overlay of square-edge maple or oak flooring. Some saving in material is effected when portions of this type flooring require renewal, but the labor cost varies little from that required to renew hardwood plank.

During the war years, when the shortage of hardwood became acute, maintenance officers were faced with the problem of repairing wood floors which were wearing out rapidly due to the unprecedented volume of freight movements. The difficulty was overcome by the application of a two-inch bitulithic surface over the existing wood floor. While the length of service of this type floor is short, observations of its use over a three-year period have shown that it will meet the requirements of present-day traffic. As an asphalt surface will not be suitable for all locations, each location must be studied to determine the types of vehicles used, the classes of freight handled, and the condition of the substructure, before any decision is made to use it.

This type floor is waterproof, and in exposed areas will prolong the life of the sub-floor. If the surface gets icy, salt or calcium chloride can be applied without damage to the composition. However, care must be exercised for about three to five months to prevent spillage of motor oil or gasoline on the surface, unless the surface has been treated with chemicals to resist the solvent action of these liquids. The initial cost of installation of this floor is comparatively low, and subsequent maintenance may be handled by one or two men applying patches as required.

Damaging Ties By Pick Tamping

To what extent are ties damaged by pick tamping? What is the effect on their service life? Does this differ between hardwood and softwood ties? What practical means, if any, can be employed to prevent this damage?

Teach Tamping Methods

By R. L. Baucom
Engineering Department, Missouri Pacific, Jefferson City, Mo.

The extent to which ties are damaged by pick tamping is, in my opinion, indeterminate. However, whenever it is done, the service life of the tie is shortened at least 50 per cent. Continuous splintering of the edges of a tie will tend to round off the corners, thereby exposing an untreated surface which is readily susceptible to the attacks of weathering forces. Also, when the corners of a tie become broken off and rounded, the bearing surface of the bottom is less, and the increased unit pressure soon destroys the tamping.

It seems reasonable that hardwood ties would be less likely to be damaged than softwood. However, the splintering that occurs more readily in hardwoods usually exposes more untreated wood and decay begins quicker.

The only practical means that may be used to prevent ties from being damaged by pick tamping is for the foreman to instruct his men in the correct manner in which ties should be tamped, and see that his instructions are followed. It is important that such instructions stress the point that the worker must clean out enough of the ballast in the crib to obtain working space, so that stones may be forced under the tie without the pick striking the lower corner.

Should Not Be Done

By Roadmaster

Ties should not be damaged if they are raised sufficiently off their old bed to allow the tamping end of the pick to get under the tie and not batter against the side or bottom corner of it. The object of tamping is to compact a sufficient amount of ballast under a tie to hold it up to a

predetermined level after it has been loaded. This is not accomplished very well by trying to force the material under a tie that has not been raised high enough to get the material under it.

It is sometimes found that where stone ballast is used on unstable roadbed, both hardwood and softwood ties have been greatly abraded by pick tamping. It would seem advisable, at such locations, to jack the track high enough to use forks or shovels to get the material under the ties and depend upon rolling loads to settle the track to the desired surface. It may be difficult to accomplish this, but it can be done.

Water Supply for Large Tenders

In what ways and to what extent do large locomotive tenders affect water supply and water-supply facilities? What special problems are involved?

Require Dependable Supply

By J. A. Holbrook
Mechanical Engineer, New York Central, New York

Larger locomotive tenders tend to permit less frequent watering or, in other words, greater distances between the main water stations which serve through trains. This, in turn, makes it necessary that the fewer water stations which remain have a somewhat greater and more dependable supply, as well as more adequate pumping, treating and storage facilities.

Additional intermediate or secondary water stations are desirable for emergency use in case of failure or interruption of a main water station.

Many Changes Needed

By G. E. Martin
Superintendent, Water Service, Illinois Central, Chicago

Large locomotive tenders have increased the demand for water at terminals and decreased it at intermediate water stations, since the purpose of larger tenders has been to eliminate stops for water between fueling stations. The increase in the quantity of water put in tenders at terminals and key stations has made it desirable to increase the rate of flow to the tender so that an excessive amount of time is not consumed taking water. This has been accomplished in many cases by increasing the size of the supply line, water column, or tank spout; and in other cases by increasing the height of the frame of the tank to secure more head. Delivery of 4,000 to 5,000 gal. per min. is not uncommon, and a few places with greater deliveries are known. With flows of 5,000 gal. per min. and greater, some difficulty in controlling the spout is encountered, and it appears advisable to fasten it to the tender while taking water at very high rates of delivery to minimize the possibility of causing personal injury to the fireman.

An increase in the consumption of water at some stations has made it necessary to increase the storage capacity of the roadside tanks to take care of the peak-load periods, so that other facilities might be held to reasonable capacities. Even with the increase in storage space, the 24-hr. demand at certain points has increased until it has become necessary to increase the water treating plant and pumping facilities so as to have an adequate supply of water at all times.

The large tenders have made a number of intermediate water stations relatively unimportant, and in some cases unnecessary. These intermediate stations can, in many cases, be retired or removed from service, thereby effecting further savings by eliminating their maintenance and operation.

Vandalism In Toilet Rooms

When modernizing stations, what can be done, in the choice of finishing materials and color schemes for toilet rooms, to minimize vandalism? What other steps can be taken by the building forces to accomplish this purpose?

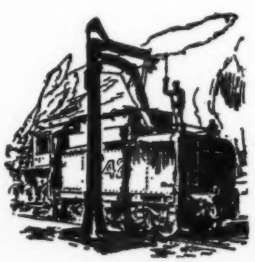
New Type Fixtures Needed

By Lester C. Tichy
Architect and Industrial Designer, New York

In my opinion, the basic design of our toilet-room fixtures and fittings should be re-examined and redesigned if vandalism is to be minimized. The fixtures that are manufactured today might be all right in a home, office or other building which is not subjected to the type of traffic the railroads have to meet. But I think that the railroads should have a special line of fixtures designed strictly for their use.

Lighting fixtures should be recessed to eliminate the possibility of bulb stealing, and should have special institutional screws or locks, if possible. I recommend that the toilet partitions be a dark color, such as dark blue, red or black, and that they have a hard, smooth surface which can be easily cleaned. Floors and walls should also be made of materials that can be cleaned easily, and that will always present an inviting atmosphere. The floors and walls should be light in color. I also believe that floor drains should be placed in toilet rooms to facilitate washing and cleaning.

The public should be made to realize that these facilities are placed in railroad stations for their convenience, and that the railroads are not compelled to provide them, but do so as a matter of courtesy. This thought might be presented in a neat, well-framed picture placed on the wall for all to see and read.



Best Materials Essential

By L. E. Peyser
Principal Assistant Architect, Southern Pacific, San Francisco, Cal.

There appears to be no practicable material that can be used in public toilets that will entirely eliminate vandalism. The finer the materials used the more intense is the ingenuity displayed to deface them. To reduce this condition as much as possible, it is important that a careful selection be made of the finishing materials that will make malicious defacement the most difficult.

Floors and walls are well protected when finished in tile. That on the walls should be glazed and should be carried up not less than six feet above the floor. The trim at doors and windows should be of the same material, so as to reduce the amount of easily damaged wood.

Toilet cubicles should have fronts and partitions of a hard, polished marble, so designed that no visible metal connections or legs are necessary. Such designs have been developed and used successfully. The marble should not be too light in color, and should be well figured to make less apparent any writing that might be done on it. If written upon, marble or other glazed surfaces can be easily cleaned. The color of the wall tile should be selected to complement the marble, and floor tile should be a moderately dark color so that dirt will not readily show. In no case should either be white.

The use of materials that are absorbent, even in a small degree, should be avoided. If they are marked with soft pencil, or by lipstick, which is a modern offender, they cannot be cleaned off, but leave a disfiguring smear even after careful washing.

Cubicle doors are often subject to defacement, particularly on the inner side. Even steel doors with an enamel finish are not immune. I believe that stainless steel, either in hollow-door construction or applied to a plywood core, might be the best solution. While both are expensive in first cost, there should be no subsequent maintenance and the doors should present an excellent appearance for many years. All fittings, equipment and fixtures should, so far as possible, be secured by concealed fastenings to make removal difficult.

The reduction of vandalism is somewhat expensive in first cost since none but superior materials will withstand the ingenious efforts of persons with destructive minds. However, the money is well spent, in that continual maintenance expense is greatly reduced.

Widening Roadway Embankments

How can one most economically and effectively widen roadway embankments? If under 5 ft.? If higher? What considerations are involved? What equipment is most suitable?

Conditions Alter Methods

By A. G. Reese
District Maintenance Engineer, Chicago, Burlington and Quincy, Galesburg, Ill.

To widen embankments economically and effectively, it is first necessary to study the physical conditions to determine the extent of the work to be done, and the type of equipment to be used. The study should also consider the traffic density to determine whether to use on or off-track equipment.

On secondary lines where traffic causes no unusual delay, the use of steam ditchers is an economical method for fill widening, since it also permits the ditching of adjacent cuts to facilitate drainage. Considering the dual accomplishment of this procedure, the unit costs are modest and in many instances are comparable to the costs when off-track equipment is used. However, the number of lines where steam ditchers can be economically operated are few.

On main lines where traffic is heavy and high speeds prevail, the use of off-track equipment is imperative, as train delays cannot be tolerated. A survey of conditions in each case will determine, by the quantities involved, whether dirt from cuts should be wasted or hauled to adjacent fills for widening the embankment.

Where lines are laid across a comparatively level terrain, fills are usually low and cuts shallow. On low fills of five feet or less in height, bulldozers can effect the necessary restoration work most economically by first scarifying the original slope, and then dozing borrowed material to form the desired cross-section. Material that is deposited in this manner will be compacted to such an extent that little subsidence will occur later. On long fills where the heights exceed five feet and borrow material is available, the dragline performs the work in the most economical manner.

In locations where cuts and fills alternate, the operation of ditching cuts and restoring fills should be handled concurrently. In this work, tractor-graders, carryalls, bulldozers, motor-patrol graders, etc., have proven efficient. Long hauls with this equipment should be avoided. Where such hauls are necessary, a shovel, loading into dump trucks, has proven effective.

The preliminary study of each location will determine the types of equipment and the number of units of each type that are required. Such information should receive serious consideration if an economical and efficient job is to be done. The use of small-capacity units where large quantities are involved, and large units where quantities are small, invariably results in excessive cost.

Several Methods Used

By D. X. Greenberg
Assistant Engineer, Missouri Pacific, Wichita, Kan.

From my experience in bank widening I have reached the conclusion that one cannot state definitely that any particular method is the most economical or the most effective, unless all the many variables that can enter the picture are known. In general, however, when widening embankments up to six feet in height, the most economical method is to use a crawler-type tractor having an angle dozer 10-ft. wide; provided that the crown of the new embankment will be wide enough to permit leveling with a 10-ft. blade. Using this equipment, the bank can be placed in 10-ft. sections with the machine working at a right angle to the track. In this way the slopes can be shaped perfectly, the crown leveled, and the borrow pits smoothed so they will drain to the lowest point.

This method is, of course, most economical when there is sufficient material available on the right of way to form the new embankment. If sufficient material can be obtained off the property, and within 35 ft. of it, this same method is still the best, even though the cost will be higher. No other equipment is as efficient where the fills are not over 500 ft. long, and cuts at each end can be widened, or sometimes even eliminated, to provide the material to widen the embankment.

There are two economical methods of widening embankments over six feet high, each best for a particular group of conditions often found in work of this nature. Where sufficient material is available on or adjacent to the right of way, it is best to use a

one-yard dragline, aided by an angle dozer levelling the crown, shaping the slopes, and smoothing the borrow pits. But under the more difficult conditions where material has to be obtained from cuts at the ends of embankments 1,000 ft. or more in length, the most economical method employs two or more 3 to 5-yd. self-loading and dumping wheeled scrapers, pulled by crawler tractors. An auxiliary angle dozer assists in placing and compacting the embankment as in the other type jobs.

Bulldozers Are Economical

By District Engineer

It has been our experience that the most effective way to widen embankments up to a maximum height of eight feet is by the use of bulldozers. This, of course, depends on the suitability and availability of material adjacent to the track. By using bulldozers, the property can be left in better condition for the use of off-track mowers than when draglines or shovels are used. The work is also accomplished more rapidly by bulldozers.

For banks higher than eight feet, it is necessary to use shovels or draglines for borrowing material adjacent to the track, or to unload materials from the track. The use of work trains for this purpose is expensive and often interferes seriously with traffic.

Regardless of the method used to get the additional material on the banks, it should be left at such a height that it can be topped with cinders to prevent erosion, give better drainage, and help to keep down the growth of weeds.

Uses Different Equipment

By Roadmaster

We think the most economical operation for widening banks where the material is available from side borrow on the right of way is to use a crawler tractor with a bulldozer blade. However, if the embankment is higher than nine feet, it would be better to cast the material into place with a dragline.

Where the material is not available on the right of way, an investigation may show that a sufficient amount can be purchased within a reasonable distance. If this is possible, it can be hauled by crawler tractors and carry-all scrapers for distances up to approximately a half mile. For any longer haul it would be better to use a dragline or crawler shovel to load trucks.

If neither of these methods is practicable because of the lack of material, then work trains will have to be used to haul the material from a more distant point. This method is expensive, and if it is necessary, the material should preferably be obtained by widening some cut within a reasonable distance, thereby improving drainage and splitting the cost of the job.

Braces On Bridge Guard Rails

Should bridge guard rails be equipped with rail braces? Under what conditions? To what extent? What are the advantages? The disadvantages?

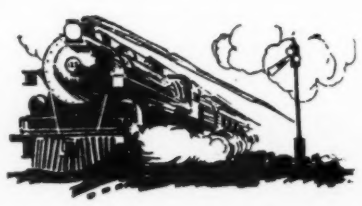
Braces Add Stability

By Division Engineer

Bridge guard rails serve only one purpose—to engage the wheels of derailed trucks, and confine their movement to the limited space between the running rail and the guard rail, thereby preventing the equipment from plunging into the opening spanned by the bridge, or seriously damaging the bridge structure.

To accomplish this purpose, such guard rails must be securely fastened to sound ties, and well maintained. It will be appreciated that they must withstand the side thrust of derailed trucks greatly in excess of any similar force normally exerted on the running rail. The latter, it is true, is held in position by the track spikes, but a lot of stability is added by the friction caused by the vertical load of the rolling equipment.

Experience has demonstrated that insufficient resistance to this lateral thrust is given by a guard rail that is merely spiked to every tie, even though it is well maintained, with all joints tight and fully bolted, and with no lipped joints, etc. Therefore, fully cognizant of the cost of even one instance where derailed equipment might strike a bridge structure, resulting in serious casualties as well as property damage, we have reinforced our bridge guard rails by adding rail braces. These braces add resistance to overturning as well as sliding friction. They are applied to every third tie on tangent track and on light curves. On sharp curves, braces are applied to every tie on the inside guard rail and on every third tie on the outside guard rail. At the ends, where the guard rails are curved to deflect the wheels of derailed equipment, braces are applied to each guard rail on every tie. To increase further the stability of this important portion of the guard rail, the braces used are of one-piece construction, having a plate on which the guard rail rests. At all other locations the guard rail rests directly on the ties, with the brace bearing against the base, web and under-side of the head. Experience with the use of braces applied to bridge guard rails in this manner has proved that the increased stability they afford, and their effectiveness warrant their continued use.



Should Be Well Braced

By L. G. Byrd
Supervisor, Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Inside guard rails are applied on bridges for the purpose of holding derailed cars in line with the main track, and to prevent cars from turning over into the bridge or projecting far enough to cause damage to the steel structure. Inside guard rails are generally extended from 60 to 70 ft. beyond each end of the structure and brought to a point at the end, or connected with a used frog point.

The weakest part of these guard rails is the tapered section extending back of the heel of the frog. This section should be well braced to withstand the impact of derailed trucks and throw them back in line with the main running rail.

On curves, where only one inside guard rail is required, the full length should be braced on alternate ties from the point where it is parallel with the running rail, and on every tie on the tapered section. All inside guard rails should be thoroughly bolted at the joints or still better, welded for their entire length.

Changes in Railway Personnel

General

Robert G. Vawter, superintendent of the Richmond division of the Chesapeake & Ohio, at Richmond, Va., and an engineer by training and experience, has been promoted to assistant general superintendent of the Western General division, with headquarters at Huntington, W. Va.

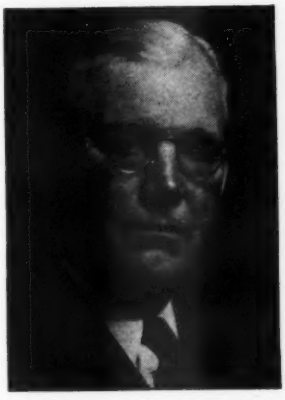
N. R. Crump, general manager of the Canadian Pacific, Eastern lines, at Toronto, Ont., and an engineer by training and experience, has been appointed vice-president and general manager, Eastern Lines, with the same headquarters, succeeding E. D. Cotterell, who has retired from active service.

J. N. Fraine, assistant superintendent of the Bruce division of the Canadian Pacific, at Toronto, Ont., has been promoted to superintendent of the Laurentian division, with headquarters at Montreal, Que., succeeding **W. F. Koehn,** who has been appointed superintendent of the Montreal Terminals division. Both men are engineers by training and experience.

Herman T. Frushour, general manager of the New York zone of the Pennsylvania, at New York, has been appointed assistant vice-president and chief engineer, with the same headquarters. **Paul D. Fox,** general auditor of the Pennsylvania system, has been elected treasurer of the system, with headquarters as before at Philadelphia, Pa. **Charles E. Adams,** chief engineer at New York, has been appointed general superintendent of the Southwestern division, with headquarters at Indianapolis, Ind.

Mr. Frushour was born at Logansport, Ind., on February 17, 1882. Following his graduation from high school in that city, Mr. Frushour served as rodman and locomotive fireman on the Logansport division of the Pennsylvania. He then entered Purdue University, graduating in civil engineering in 1907. Returning to the Pennsylvania as assistant on the engineering corps, he served as assistant engineer at Cincinnati, Ohio, and division engineer at Cleveland, Ohio. On July 1, 1928, he became superintendent of the Monongahela division, at Uniontown, Pa., later being transferred successively to the Erie and Ashtabula, the St. Louis and the Eastern divisions. On November 1, 1935, Mr. Frushour became superintendent of the Long Island railroad at Jamaica, N.Y. He became general superintendent of the Western Pennsylvania division of the Pennsylvania at Pittsburgh on September 16, 1939, and on August 16, 1942, he was advanced to general manager of the New York zone, with headquarters at New York, the position he held until his recent appointment.

Mr. Adams was born at Kokomo, Ind., and completed his engineering studies at Ohio State University in 1912. He entered railroad service in 1907 during a vacation from school, serving in the operating department of the Pennsylvania. From 1907 to 1908 he was yard clerk and from 1908 to 1920, assistant on the engineer corps, successively on the Richmond, Cincinnati and Akron divisions. Mr. Adams was promoted to supervisor at Akron in 1920, and in October, 1922, he



Herman T. Frushour

was transferred to the Buffalo division at East Aurora, N.Y., being transferred to the Eastern division at Rochester, Pa., in April, 1926. From 1928 to 1929 he served successively as division engineer of the St. Louis division at Terre Haute,

Charles E. Adams

Ind., and of the Philadelphia Terminal division. Mr. Adams served as general agent at Grand Rapids, Mich., from December, 1929 to 1930, and from the latter date until June, 1932, he was superintendent of the Grand Rapids division, being transferred to the Toledo (Ohio) division in June, 1932, and to the Panhandle division at Pittsburgh, Pa., in July, 1933. He was transferred to the Pittsburgh division in February, 1937, and on September 16, 1939, he was appointed superintendent of the Long Island. In November, 1940, he was advanced to chief engineer at New York, the position he held at the time of his recent appointment.

Engineering

John A. Chase, bridge engineer on the Boston & Albany, with headquarters at Boston, Mass., has retired after more than 45 years of service.

R. F. Correll, locating engineer on the Atchison, Topeka & Santa Fe, has been appointed assistant engineer, with headquarters as before at Topeka, Kan.

R. H. Kugler, assistant engineer on the New York Central, has been appointed engineer of construction, with headquarters as before at New York.

P. F. Nichols, division engineer on the Erie, at Youngstown, Ohio, has been appointed assistant engineer, with headquarters at Marion, Ohio.

E. L. Zahm has been appointed water engineer on the Missouri-Kansas-Texas, with headquarters at Parsons, Kan., where he succeeds **J. H. Davidson,** who has retired.

D. H. Dowe, general steel bridge inspector on the Seaboard Air Line, has been appointed assistant engineer of bridges, with headquarters at Norfolk, Va.

J. R. Traphoner, assistant to chief engineer on the Seaboard Air Line, at Norfolk, Va., has been promoted to division engineer, with headquarters at Jacksonville, Fla.

B. G. Packard, assistant engineer on the Chicago & North Western, at Chicago, has been appointed drainage engineer, with the same headquarters, succeeding **J. P. Datesman,** whose recent appointment as division engineer at Huron, S.D., was reported in the February issue.

B. Laubenfels, division engineer on the Chicago, Burlington & Quincy, at Burlington, Iowa, has been appointed engineer grade separation, with headquarters at Chicago. **F. L. McLean** has been appointed acting division engineer at Burlington, succeeding Mr. Laubenfels.

Eli Christiansen, assistant engineer of buildings on the Chicago, Rock Island & Pacific, at Chicago, has been appointed engineer-architect, with the same headquarters, succeeding **A. T. Hawk,** whose recent retirement was reported in the January issue.

C. R. Montgomery, division engineer on the Monongahela division of the Pennsylvania, has been transferred to the Cleveland division, with headquarters at Cleveland, Ohio, to succeed **W. T. Hammond,** who in turn replaces Mr. Montgomery, at Pittsburgh, Pa.

B. J. Minetti, assistant engineer on the Central of New Jersey, at Jersey City, N.J., has been appointed assistant bridge engineer, a newly created position, with headquarters as before at Jersey City.

E. T. Anderson, assistant supervisor of track, at Long Branch, N.J., has been temporarily appointed assistant engineer, at Jersey City.

A. H. Whisler, assistant engineer in charge of organizing rail-laying trains on the Eastern region of the Pennsylvania,

under the supervision of the chief engineer maintenance of way of that region, has been appointed assistant engineer in the office of the chief engineer, system, with headquarters as before at Philadelphia, Pa., succeeding **J. G. Hartley,** who has retired.

L. E. Lyon, assistant division engineer on the Southern Pacific, at Tucson, Ariz., has been appointed division engineer on the Rio Grande division, with headquarters at El Paso, Tex., succeeding **W. M. Jackle,** who has been transferred to the Coast division, with headquarters at San Francisco, Cal., to replace **J. B. Dawson,** assigned to other duties.

C. H. Gaylord has been appointed division engineer on the Oklahoma division of the Chicago, Rock Island & Pacific, with headquarters at El Reno, Okla., succeeding **Samuel L. McClanahan,** whose retirement was reported in the January issue, and whose death occurred on February 3, at Versailles, Mo. For the past several months Mr. Gaylord has been in charge of construction on the new line between Eldon, Iowa, and Paris. He was formerly division engineer on the Southern division at Houston, Tex.

H. L. Roblin, the announcement of whose promotion to district engineer on the Canadian National, with headquarters at Edmonton, Alta., appeared in the February issue, was born at London, Ont., and received his higher education at the University of Toronto. After serving in the armed forces, he entered the service of the Canadian National in 1918 as a resident engineer on branch line construction at Edmonton. In 1925 he was appointed roadmaster, and in 1941 he was advanced to division engineer, with headquarters at Regina, Sask., the position he held at the time of his recent promotion.

D. H. Shoemaker, whose promotion to office engineer on the Northern Pacific, with headquarters at St. Paul, Minn., was announced in the January issue, was born

D. H. Shoemaker

at Bushnell, S.D., on June 18, 1905, and was graduated by the University of Minnesota in 1929 with a B. S. degree in civil engineering. He entered railroad service on October 6, 1929, as a draftsman in the bridge department of the Northern Pacific, at St. Paul. From May, 1932, to May, 1936, he served with various other concerns, then re-entering the service of the Northern Pacific as a draftsman in the bridge department, at St. Paul. In August, 1936, he became an instrumentman on the Lake Superior division, with headquarters at Duluth, Minn. In November, 1936, he became a rodman, at Duluth, and served in that capacity until July, 1937, when he was appointed inspector at St. Paul. From October, 1940, to February, 1941, he served as a draftsman in the bridge department at St. Paul. In February, 1941, he was appointed assistant engineer on the Fargo division, with headquarters at Fargo, N. D., serving there until June, 1942, when he was transferred to the Yellowstone division, with headquarters at Glendive, Mont., where he remained until December, 1943. On the latter date he became assistant engineer in charge of construction of the Bozeman tunnel. In May, 1945, he was appointed assistant engineer in charge of location and construction on the New Salem line change, with headquarters at St. Paul, which position he held at the time of his new appointment.

Thomas W. White, whose retirement as district engineer on the Canadian National, with headquarters at Edmonton, Alta., was reported in the February issue, was born at Clinton, Ont., on November 29, 1880, and received his higher educa-

Thomas W. White

tion at Wesley College, Winnipeg, Man. He entered railroad service in 1901 as a rodman on location and construction west of Winnipeg. In the spring of 1903 he was transferred to the bridge engineering department, in which, on June 1, 1905, he was appointed assistant engineer, with headquarters at Winnipeg. On October 1, 1911, Mr. White was promoted to division engineer, bridge engineering department, with the same headquarters, and served in that capacity until January 1, 1919, when he was advanced to district engineer, at Edmonton, the position he held at the time of his retirement.

L. P. Drew, the announcement of whose promotion to engineer of design and construction, engineering department, of the Union Pacific, with headquarters at Omaha, Neb., appeared in the February issue, was born at Clarion, Iowa, on July 7, 1891, and was graduated by Iowa State College in 1912 with a B. S. degree in civil engineering. He entered railroad service in 1910 as a bridge carpenter on the Oregon Short Line, and in September, 1912, he was appointed instrumentman and draftsman. After a short period of private employment, Mr. Drew returned to the O. S. L., subsequently serving as draftsman and assistant engineer until December, 1923, when he was appointed bridge engineer of the Los Angeles & Salt Lake (now part of the U. P.). In 1933 he was appointed bridge inspector on the U. P., at Salt Lake City, Utah,

L. P. Drew

and served in that capacity until he was named division engineer in 1941. In March, 1942, he was advanced to bridge engineer, with headquarters at Omaha, Neb., the position he held at the time of his recent promotion.

J. E. South, assistant engineer of bridges of the Pennsylvania, has been promoted to engineer of bridges and buildings, with headquarters at Philadelphia, Pa., succeeding **Allen R. Wilson,** who has retired. **A. H. Hillman** has been appointed assistant engineer of bridges, and **A. P. Kouba** has been appointed office engineer in the office of the chief engineer.

Mr. Wilson was born at Bordentown, N.J., on January 15, 1877, and received a mechanical engineering degree from Drexel Institute, Philadelphia, in 1896. He has been associated with the Pennsylvania's engineering department for almost 45 years, serving as engineer of bridges and buildings since 1927. Mr. Wilson is a former president of the A.R.E.A.

C. T. Gunsallus, whose appointment as district engineer on the Boston & Albany, with headquarters at Boston, Mass., was reported in the February issue, was born on December 6, 1899, at Beech Creek, Pa. He was graduated in civil engineering from Pennsylvania State College in 1924 and entered railroad service in June of that year with the engineering corps of the New York Central, where he served until November, 1927. From the latter date until June, 1936, Mr. Gunsallus served as assistant supervisor of track at Watertown, N.Y., Newburgh and Beacon, successively, then becoming supervisor of track at Richland, New York and Beacon, successively. He was appointed division engineer, New York Central Lines, Buffalo and east, at Watertown, in June, 1943, which position he was

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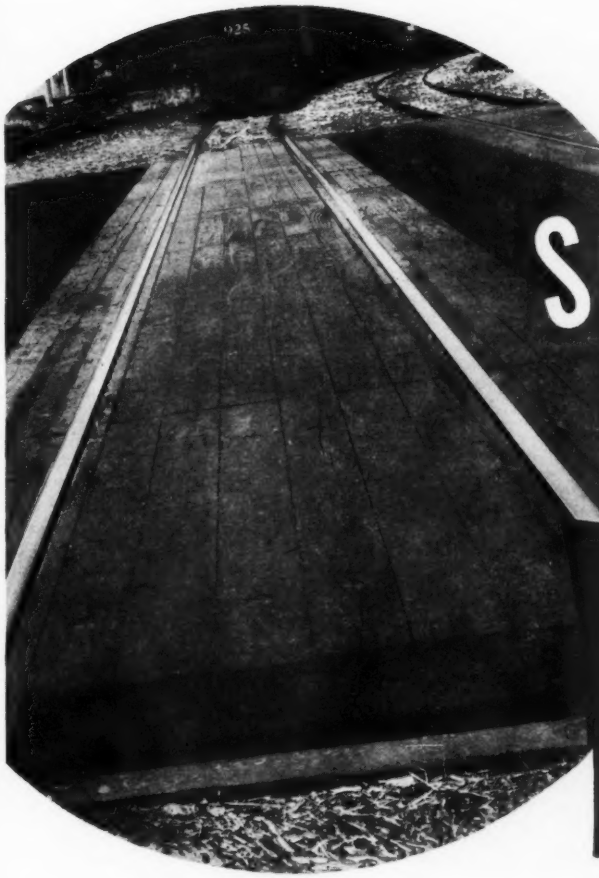

Smooth crossings

ARE GOODWILL BUILDERS

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The December 28th issue of Collier's magazine carried an article by Kyle Crichton telling of the plans of our American railroads for maintaining and improving their competitive position with the riding public.

But spectacular streamliners and comfortable seats are not the only goodwill merchants in the business. Grade crossings also command the attention of the public, and your crossings can rate a "thank you" if they're table top smooth Moss sectional crossings. Conversely, they will bring forth a different kind of comment if they're rough enough to jar your eye teeth, as are some we know.

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holding at the time of his recent appointment as district engineer of the Boston & Albany at Boston.

F. H. Simpson, assistant chief engineer on the New York Central, Lines West, has been promoted to engineer maintenance of way, Lines West, in charge of roadway and structures, a newly created

F. H. Simpson

position, with headquarters as before at Chicago. The position of assistant chief engineer has been abolished.

Mr. Simpson was born at Fulton, N. Y., on January 18, 1893, and graduated in civil engineering from Rensselaer Polytechnic Institute in 1915. He entered railway service in that year as a rodman on the New York Central at Poughkeepsie, N.Y., and from November, 1917, to July, 1919, he served in France with the U. S. Army. In August, 1919, Mr. Simpson returned to the New York Central as assistant resident engineer, with headquarters at New York, and one year later he was transferred to the New York Terminal district. In April, 1937, he was advanced to assistant engineer, with the same headquarters, and two years later he was promoted to assistant district engineer at Detroit, Mich. In October, 1942, Mr. Simpson was transferred to Cleveland, Ohio, and on April 1, 1943, he was advanced to assistant chief engineer, with headquarters at Chicago.

A. H. Simon, assistant structural engineer of the Chicago, Burlington & Quincy, has been appointed engineer of buildings, with headquarters as before at Chicago, succeeding **H. G. Dalton,** whose death on January 14, at Wilmette, Ill., was reported in the February issue. **J. E. Nielsen** chief draftsman to the structural engineer, at Chicago, has been appointed assistant engineer of buildings, with the same headquarters, succeeding Mr. Simon.

Mr. Simon was born at High Bridge, Wis., on July 9, 1888, and was graduated by the University of Wisconsin in 1913 with the degree of B. S. in civil engineering. He entered the service of the Burlington in 1922 as an estimator and designer. From 1926 to 1942 he served as chief draftsman in the building department. In the latter year he was advanced to assistant structural engineer, building department, the position he held at the time of his recent appointment.

F. H. Masters, chief engineer of the Elgin, Joliet & Eastern, at Joliet, Ill., has been appointed special engineer, with the same headquarters. **F. G. Campbell,** assistant chief engineer, at Joliet, has been appointed chief engineer, with the same headquarters, succeeding Mr. Masters. **S. H. Shepley,** division engineer, at Gary, Ind., has been appointed assistant chief engineer, with headquarters at Joliet, succeeding Mr. Campbell.

Mr. Masters was born in Clinton County, Ind., on June 30, 1879, and was graduated by Indiana University (A.B., 1902), and by Cornell University (C.E., 1904). He entered the service of the Elgin, Joliet & Eastern in August, 1906, as assistant engineer, maintenance and construction. From 1907 to 1918 he served as assistant engineer and division engineer maintenance and construction, at Gary, Ind. In April, 1918, he was appointed assistant

F. G. Campbell

chief engineer, with headquarters at Joliet, Ill., and in January, 1939, he was advanced to chief engineer, the position he held at the time of his recent appointment.

Mr. Campbell was born at Meade, Kan., on May 9, 1891, and received his higher technical training at Kansas State Agricultural College. In November, 1911, he entered the service of the Kansas City Southern, as rodman. In September, 1912, he was promoted to transitman, and two months later he went with the Chicago, Milwaukee, St. Paul & Pacific as an instrumentman, and served later as resident engineer and assistant engineer. Released from the armed forces on November, 1918, he returned to the Milwaukee as an assistant engineer, and was promoted to cost engineer in April, 1923. From March to December of 1926, he served with Mark W. Potter on the appraisal of the Consolidated Railroads of Cuba. In January, 1927, he was appointed assistant valuation engineer of the Elgin, Joliet & Eastern, at Joliet, Ill., and two years later, was promoted to valuation engineer. Mr. Campbell was appointed special engineer in August, 1933, and served in that capacity until January, 1939, when he was advanced to assistant chief engineer, the position he held at the time of his recent promotion.

J. A. Stocker, whose retirement as consulting engineer on the New York Central, with headquarters at Cleveland, Ohio, was announced in the February issue, was born at Gnadenhutten, Ohio, on April 11, 1875, received a civil engineering degree from Ohio State University in 1902, and entered railroad service that same year as rodman on the Kanawha & Michigan (now New York Central). He served in various capacities in the engineering department until 1910, when he became chief engineer of the Ohio Central lines of the New York Central, at Columbus, Ohio. From 1931 to October 1, 1939, Mr. Stocker was engineer of construction of the New York Central, at Cleveland, becoming district engineer there on the latter date. He was appointed consulting engineer of the system on January 15, 1944.

T. H. Jenkins, whose appointment as bridge engineer on the Grand Trunk Western, with headquarters at Detroit, Mich., was reported in the February issue, was born at Toronto, Ont., on May 1, 1902, and was graduated by the University of Toronto in 1925 with the bachelor's degree in civil engineering. He entered the service of the Grand Trunk Western on November 1, 1926, as a draftsman in the office of the chief engineer at Detroit. From 1928 to 1933 he served as designer and squad leader on the Royal Oak to Pontiac relocation, and from 1933 to 1940 as designer and estimator on project assignments. In 1940 he

T. H. Jenkins

was advanced to chief draftsman in the office of the chief engineer, the position he held at the time of his promotion.

B. H. Prater, whose appointment as engineering consultant on the Union Pacific, with headquarters at Omaha, Neb., was reported in the February issue, was born at Bingham, Ill., on November 11, 1881, and was graduated by the University of Illinois in 1903 with a B. S. degree in civil engineering. During 1903 and 1904 he served as instructor in surveying and as assistant in bridge design at the University of Illinois. He entered the service of the Oregon Short Line (part of the Union Pacific) in 1906 as a draftsman, and subsequently served as chief draftsman, office engineer, and engineer of buildings. In 1919 he was appointed engineer maintenance of way, with headquarters at Pocatello, Idaho, and in 1925 he

(*Continued on page* 314)

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PENNSYLVANIA

became chief engineer of the O.S.L., at Salt Lake City, Utah. In 1932 he became district engineer, with jurisdiction over the Western units of the Union Pacific, at Salt Lake City, and in January, 1937, he was advanced to chief engineer of the U. P., with headquarters at Omaha, Neb.

H. M. Schudlich, whose promotion to engineer of water service on the Northern Pacific, with headquarters at St. Paul, Minn., was reported in the February issue, was born at Pemberville, Ohio, on March 8, 1905, and received his higher technical training at the University of Minnesota. He entered the service of the Northern Pacific on September 15, 1928, as a water inspector, and served in that capacity at various points in North Dakota and Montana. On October 1, 1936, he was appointed chief water inspector, with headquarters at Billings, Mont., where he served until March 16, 1942, when he was advanced to chief chemist, with the same headquarters.

James S. Wearn, assistant chief engineer maintenance of way and structures of the Central lines of the Southern, with headquarters at Knoxville, Tenn., has been promoted to chief engineer maintenance of way and structures of the Western lines at Cincinnati, Ohio, succeeding **D. William Brosnan,** whose appointment as general manager of the Central lines at Knoxville, is noted elsewhere in these columns. **J. Edward Griffith,** division engineer at Richmond, Va., has been promoted to assistant chief engineer maintenance of way and structures, with headquarters at Knoxville, Tenn., succeeding Mr. Wearn.

W. Y. Ware, whose promotion to division engineer on the Atchison, Topeka & Santa Fe, with headquarters at Temple, Tex., was announced in the January issue, entered the service of the Santa Fe in September, 1916, as a transitman at Topeka, Kan. From April, 1917, to July, 1919, he served in the U. S. Army, and on the latter date returned to the Santa Fe as masonry inspector at Arkansas City, Kan., where he remained until March, 1920. Following a period of private employment, he re-entered the service of the Santa Fe in April, 1925, as a rodman at Chillicothe, Mo., and served subsequently as transitman and office engineer at the same place. From March 1, 1930, to March 1, 1931, he served as assistant engineer at Streator, Ill., and from the latter date to July 18, 1936, as office engineer at Chillicothe. On July 20, 1936, Mr. Ware became chief engineer on the Toledo, Peoria & Western, at Peoria, Ill., served there until April 15, 1942, spent a year in private employment, and returned to the Santa Fe on January 20, 1943, as a transitman at Galveston, Tex. In September, 1943, he became assistant engineer.

John E. Gault, the announcement of whose promotion to assistant chief engineer of the Chicago, Indianapolis & Louisville, with headquarters at Lafayette, Ind., appeared in the February issue, was born at Lafayette on June 5, 1904, received his higher technical training at Purdue University, and entered railroad service in the summer of 1926 on the engineering corps of the C. I. & L. From 1927 to 1930 he served successively as an assistant engineer with the division of highways of the City of Akron, Ohio, and the Baltimore & Ohio, at Connellsville, Pa., and Dayton, Ohio. He became general foreman, construction, on the B. &

John E. Gault

O., at Toledo, Ohio, in 1930, and assistant engineer, at Indianapolis, Ind., in 1931. From 1934 to 1938 Mr. Gault was in private business at Lafayette. In the latter year he was appointed track supervisor on the Denver & Rio Grande Western, at Denver, Colo. A year later he entered the service of the C. I. & L. as track supervisor, at Lafayette. In 1942 he was advanced to roadmaster, with the same headquarters.

Col. H. M. Smitten, whose retirement as bridge engineer of the Western Pacific, with headquarters at San Francisco, Cal., was reported in the February issue, was born in San Jose, Cal., on February 8, 1878, and was educated in the public schools of Honolulu, and San Francisco. After attending the University of California in 1898, as a special student, he entered the employ of the San Francisco Bridge Company, working on a harbor development project in Guatemala. Returning to the United States the following year, he became a draftsman for a San Francisco architect, subsequently holding this position with various concerns. In 1906 Colonel Smitten went with the Southern Pacific and was engaged in bridge design. In 1917 he entered the United States Army as a captain, Quartermaster Corps, Construction division. Later he was advanced to major, 34th Engineers, and to lieutenant colonel, 37th Engineers. Upon his discharge from the Army in 1920, Colonel Smitten returned to the S. P. as assistant engineer in the valuation department. In September, 1921, he went with the Western Pacific as bridge engineer.

Bridge and Building

Ralph Youngblood, assistant supervisor of bridges and buildings on the Central of Georgia, at Savannah, Ga., has been promoted to supervisor of bridges and buildings, with the same headquarters, to succeed **Stone Youngblood,** whose death is reported elsewhere in these columns. **W. W. Walden,** plumber at the Savannah terminals, has been promoted to assistant supervisor of bridges and buildings at Savannah, succeeding Ralph Youngblood.

Track

Charles M. Webb, roadmaster on the Chicago, Rock Island & Pacific, with headquarters at Enid, Okla., has retired.

H. P. Sullivan, supervisor of track on the New York Central, with headquarters at Terre Haute, Ind., has retired after more than 50 years of railroad service.

J. B. Dinwiddie has been appointed roadmaster on the Southern Pacific, at El Paso, Tex. **B. G. Barnum** has been appointed roadmaster at Carrizozo, N. M. **C. O. Hogland** has been appointed roadmaster at Deming, N. M.

F. J. Haase, section foreman on the Chicago & North Western, at Fond du Lac, Wis., has been promoted to assistant roadmaster on the Galena division, with headquarters at Chicago.

H. H. Gudger has been appointed roadmaster on the Missouri Pacific, with headquarters at Conway Springs, Kan., where he succeeds **I. E. Short,** whose recent death is reported elsewhere in these columns.

S. H. MacKenzie, assistant roadmaster on the Moncton division of the Canadian National, has been promoted to roadmaster on the Campbellton division, succeeding **W. A. Bulmer,** retired.

Charles Raynor has been temporarily appointed assistant supervisor of track on the Central of New Jersey, with headquarters at Long Branch, N. J., to replace **E. T. Anderson,** whose temporary appointment as assistant engineer at Jersey City, N. J., is reported elsewhere in these columns.

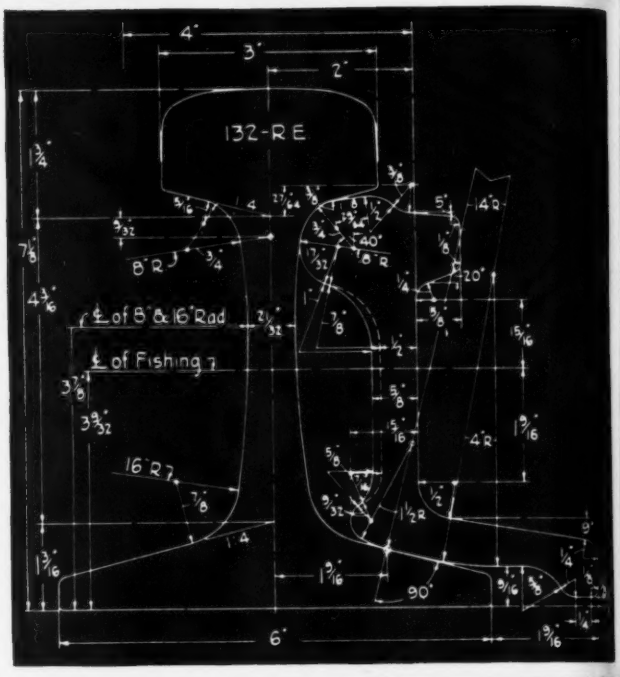
Frank Corrigan, extra gang foreman on the Syracuse division of the New York Central, at Clyde, N. Y., has been promoted to assistant supervisor of track on Subdivision 22, Mohawk division, with headquarters at South Schenectady, N. Y., to succeed **R. C. Swanson,** who has been transferred to Subdivision 5, Mohawk division, with headquarters at Albany, N. Y., where he replaces **T. F. Mahar,** who has retired.

V. K. Lowe, whose promotion to roadmaster on the Norfolk & Western, with headquarters at Fort Gay, W. Va., was reported in the February issue, entered railroad service in 1911 as a trackman on the Pocahontas division. Later he served as carpenter and brakeman on the same division. In 1917 he was promoted to section foreman, and six years later he was advanced to assistant roadmaster on the Scioto division, the position he held at the time of his recent promotion.

R. V. Dangremond, track supervisor on the Elgin, Joliet & Eastern, at Gary, Ind., has been appointed roadmaster on the Gary division, with the same headquarters. The position of division engineer on

(*Continued on page* 318)

NEW JOINT BAR



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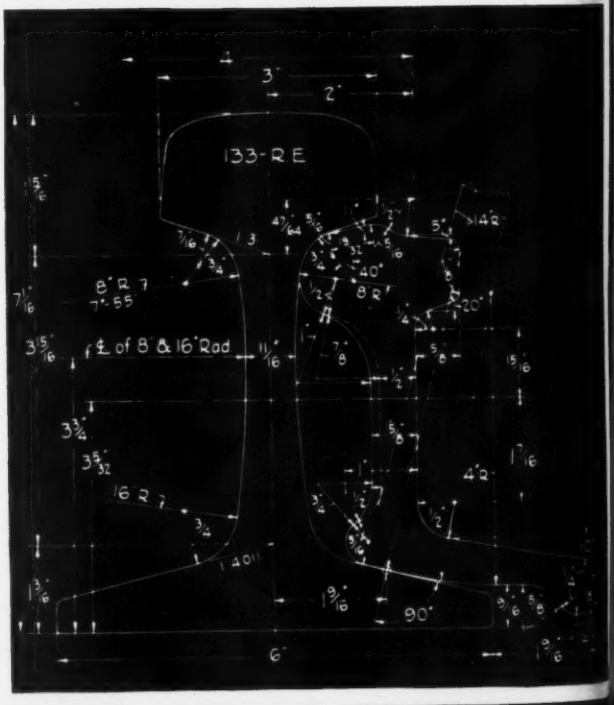
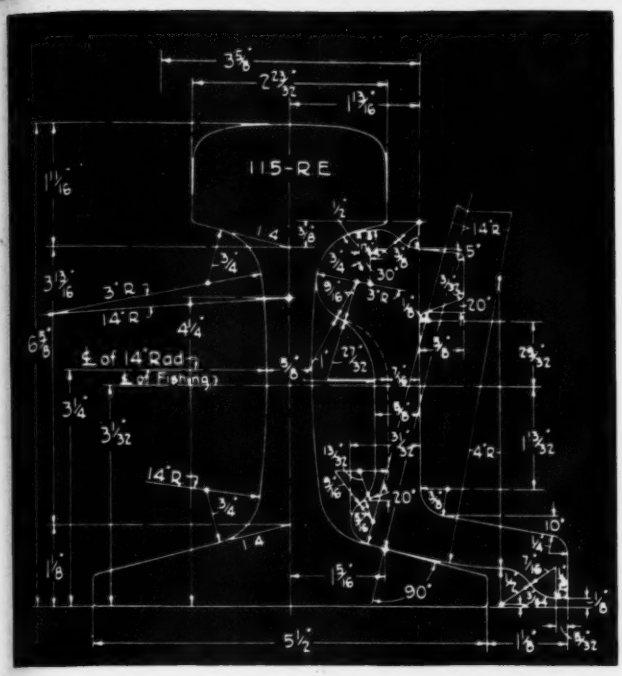
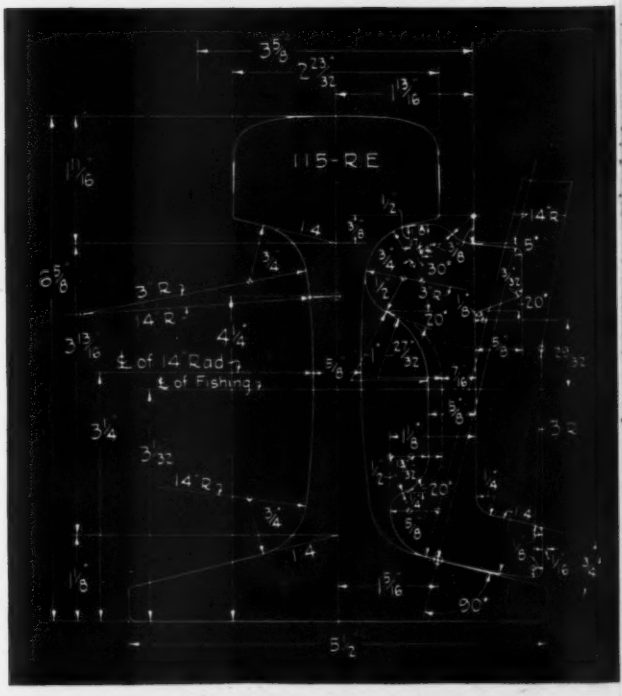


THE RAIL JOINT COMPANY INC

FOR NEW RAILS



STRENGTH AND PER UNIT STIFFNESS



50 CHURCH ST., NEW YORK 7, N.Y.

(*Continued from page* 314)

the Gary division has been abolished. **H. M. Overpeck** has been appointed supervisor of track, with headquarters at South Chicago, Ill. **H. W. Lane** has been appointed supervisor of track on the Joliet division, with headquarters at Joliet, Ill. The position of assistant supervisor of track on the Joliet division has been abolished. **G. A. Beahm** has been appointed supervisor of track, with headquarters at Kirk yard, Gary.

W. R. Dunn, Jr., supervisor of track on the Wilkes-Barre division of the Pennsylvania, at Reading, Pa., has been assigned to special duties in the office of the controller, with headquarters at Philadelphia, Pa., and **D. J. Marotta,** assistant supervisor of track on the Philadelphia terminal division at Philadelphia, Pa., has been promoted to supervisor of track, to succeed Mr. Dunn at Reading. **W. B. Knight,** assistant supervisor of track, Erie & Ashtabula division, Niles, Ohio, has been transferred to the Philadelphia terminal division, to succeed Mr. Marotta, and **V. B. Siems, Jr.,** assistant on the engineer corps on the Maryland division has been promoted to assistant supervisor of track on the Erie & Ashtabula division, with headquarters at Niles.

Water Service

H. C. Little has been appointed water works supervisor on the Illinois Central, with headquarters at Vicksburg, Miss., succeeding **A. E. St. John,** deceased.

Special

H. L. Riser, assistant supervisor of track on the New York Central at Mattoon, Ill., has been appointed fire prevention engineer, with headquarters at Cincinnati, Ohio.

H. E. Skinner, bridge inspector on the Elgin, Joliet & Eastern, at Joliet, Ill., has been appointed supervisor of scales and work equipment, with headquarters at East Joliet, Ill. The positions of bridge inspector and supervisor of work equipment have been abolished.

Obituary

I. E. Short, roadmaster on the Missouri Pacific, with headquarters at Conway Springs, Kan., died on February 8.

S. A. Moody, roadmaster on the Canadian National, at London, Ont., died recently. He was 77 years old.

Charles F. Ehrlich, who retired in April, 1946, as assistant engineer on the Missouri Pacific, died recently at his home in Arcadia, Mo.

Egbert I. Rogers, former president of the Peoria & Pekin Union, with headquarters at Peoria, Ill., and an engineer by training and experience, died on February 3 at Peoria.

Stone Youngblood, supervisor of bridges and buildings on the Central of Georgia, at Savannah, Ga., was fatally injured in a motor car accident near Millen, Ga., on January 9. He was 34 years old.

Association News

Bridge & Building Association

President F. G. Campbell has called a meeting of the Executive committee of the association in Chicago on March 6, at 9 a.m., at the Chicago Engineers' Club. With the work of the technical committees well under way, the purpose of this meeting is primarily to give consideration to the preliminary plans being made for the annual meeting in September, concurrent with the annual meeting of the Roadmasters' Association, and to decide upon specific features of the program.

American Railway Engineering Association

As indicated at another place in this issue, plans have been completed for the annual meeting that is scheduled to be held at the Palmer House, Chicago, on March 18-20. Since all of the committees have completed their work for the year, no committee meetings were held in February.

Bulletin 465, containing the reports of the committees on Roadway and Ballast, Track, and Rail, and comprising 350 pages, was mailed to members on February 21. This will be the last bulletin to be issued prior to the convention, with the exception of the Year Book, Bulletin 466, which will be available for distribution at the convention, if not before.

Wood Preservers' Association

In connection with the annual meeting of the association to be held at the Multnomah Hotel, April 22-24, the Transportation committee has set up a special train from Chicago to Portland, via the Chicago, Milwaukee, St. Paul & Pacific and Union Pacific. The tentative schedule for this train calls for leaving Chicago at about 11 p.m., Friday, April 18, with a daylight ride through the Rockies and stopovers at The Dalles, Bonneville Dam and Multnomah Falls, arriving in Portland about 4 p.m. on April 21, the day prior to the opening of the annual meeting. Complete information relative to the "Convention Special" will be mailed to members early in March, together with other details concerning the annual meeting.

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 16-18, 1947, Hotel Stevens, Chicago.

American Railway Engineering Association—Annual Meeting, March 18-20, 1947, Palmer House, Chicago.

American Wood-Preservers' Association—Annual meeting, April 22-24, 1947, Multnomah hotel, Portland, Ore.

Bridge and Building Supply Men's Association—Joint exhibit with Track Supply Association, September 15-18, Hotel Stevens, Chicago, during concurrent conventions of American Railway Bridge and Building Association and Roadmasters' Association.

Maintenance of Way Club of Chicago—Next meeting, March 24, Harding's at the Fair, 6:30 p.m.

National Railway Appliances Association—Thirty-second annual exhibit, Coliseum, Chicago, March 17-20, in connection with A.R.E.A. convention.

Railway Tie Association—Annual meeting, September 23-25, 1947, Arlington hotel, Hot Springs, Ark.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 16-18, 1947, Hotel Stevens, Chicago.

Track Supply Association—Joint exhibit with Bridge and Building Supply Men's Association, September 15-18, Hotel Stevens, Chicago, during concurrent conventions of Roadmasters' Association and American Railway Bridge and Building Association.

Maintenance of Way Club of Chicago

The next meeting of the club, to be held on March 24, will be addressed by H. C. Marmaduke, executive representative, Illinois Central System, who will speak on the Employees' Suggestion System in effect on the Illinois Central for the last eight years, under which more than 210,000 suggestions have been offered and 36,000 accepted and placed in effect. The meeting will be held in Harding's Restaurant on the seventh floor of the Fair Store, beginning with dinner at 6:30 p.m. The meeting will start at 8:00 p.m.

The February meeting of the club, with 139 members and guests in attendance, was addressed by G. R. Westcott, assistant engineer, Missouri Pacific Lines, on Maintaining Roadway Equipment. Mr. Westcott's address, practically in full, is presented elsewhere in this issue. It comprises a comprehensive discussion of the problem involved in building an organization to maintain work equipment most efficiently.

National Railway Appliances Association

Plans are complete for the Thirty-Second Annual Exhibit of the National Railway Appliances Association, to be held in Chicago, March 17-20, in conjunction with the annual meeting of the American Railway Engineering Association. Elsewhere in this issue is a letter from President W. J. Hanna (Republic Steel Corporation) inviting the readers of *Railway Engineering and Maintenance* to attend the exhibit, together with a complete list of exhibitors to date, with their booth numbers, and a plan of the exhibit hall.

Roadmasters' Association

The personnel of the six technical committees to present reports for the current year have been selected and the work of the various committees is well under way. Following is a list of the various committees and their chairmen:

No. 1—Advance Preparation of Track for Rail Renewals—R. W. Putnam, asst. engr. m.w. & s., S.P., San Francisco, Cal.

No. 2—Methods of Increasing the Production of Extra Gangs—R. G. Simmons, gen. trk. insp., C.M.St.P.& P., Chicago.

No. 3—Roadmaster's Responsibility in Controlling Maintenance of Way Costs—J. E. Gault, asst. ch. engr., C.I.& L., Lafayette, Ind.

No. 4—Safety in Operation of Motor Cars and Work Equipment—J. E. Griffith, asst. ch. engr. m. w. & s., Southern, Knoxville, Tenn.

No. 5—Installation and Maintenance of High-Speed Turnouts—R. E. Meyer, rdm., C. & N.W., Sterling, Ill.

No. 6—Development and Training of Track Foremen—Charles Weiss, supvr., P.R.R., Valparaiso, Ind.

President E. J. Brown has called a meeting of the Executive committee in Chicago, March 17, at 9 a.m., at the Chicago Engi-

(*Continued on page* 322)

"At the Controls" for Dependable Stops and Starts

From the days when power-operated work equipment was first produced, right down to the present time... the name Johns-Manville on brake linings, brake blocks, or clutch facings has always meant dependable stops and starts.

Maintenance men know these materials are long-wearing, mechanically strong and remarkably free from tendency to score or heat-check the friction surface. Available in a wide variety of flexible and rigid styles, J-M Industrial Friction Materials provide immediate, positive control for all types of brakes and clutches on shovels, drag lines, hoists, winches, cranes and other power-operated equipment.

For full details, including handy recommendation chart, write Johns-Manville at New York, Chicago, Cleveland, St. Louis or San Francisco.

JOHNS-MANVILLE JM

Johns-Manville

INDUSTRIAL FRICTION MATERIALS

BRAKE LININGS • BRAKE BLOCKS • CLUTCH FACINGS

(*Continued from page* 318)

neers' Club, to review the preliminary plans being made for the annual convention in September, concurrent with the annual meeting of the American Railway Bridge and Building Association, and to give consideration to details of the program of the meeting.

Supply Trade News

Personal

H. F. Jorgensen has joined the staff of **The John N. Thorp Company,** 50 Church street, New York 7.

R. H. Miller has been appointed service engineer of the **Dearborn Chemical Company,** with headquarters at Fort Worth, Tex. He was formerly water engineer on the Ann Arbor, at Owosso, Mich.

Henry C. Johnston, recently released from the armed forces, has resumed his duties as export traffic supervisor of the traffic department of the **Caterpillar Tractor Company,** Peoria, Ill.

Joseph G. Cooper has been appointed assistant to the vice-president—traffic of the **Bethlehem Steel Company,** with headquarters at Bethlehem, Pa. He formerly was assistant to the general traffic manager.

N. H. Snyder, representative of **The Rail Joint Company,** at Chicago, has been appointed representative at St. Louis, Mo., with headquarters at 319 N. Fourth street in that city.

The **Railway Track-Work Company,** Philadelphia, Pa., has authorized the following new sales representatives: **R. E. Bell Company,** St. Louis, Mo.; **Leon E.** and **Glen C. Hunt,** Atlanta Terminal Station Building, Atlanta, Ga.; **Robert L. Nutt, Jr.,** National Bank of Commerce Building, Norfolk, Va.; **W. A. Peck,** 59 East Van Buren street, Chicago.

The Rust-Oleum Corporation, Evanston, Ill., has announced the appointment of three factory sales representatives. **U. S. Ackles,** with headquarters at Seattle, Wash., becomes representative for Washington, Oregon and part of Idaho. **A. A. Ahlff,** with headquarters at St. Louis, Mo., will cover Iowa, central and southern Illinois, and eastern Missouri. **Paul Moffit,** with headquarters at Kalamazoo, Mich., will serve distributors in western Michigan and part of northern Illinois. **Jack Thorp,** president of John N. Thorp Company, New York, has been appointed railroad sales agent for certain railroads serving the New York area. His headquarters are at 50 Church street, New York.

The **United States Steel Corporation** has announced the following changes: **Gerald E. Rhodes,** assistant to the manager, **American Bridge Company,** at Gary, Ind., has been promoted to assistant manager, succeeding **Jay K. Thompson,** who has retired. **James M. Darbaker,** assistant

(*Continued on page* 326)

Mason Street is QUIETER Now

Pressure-welded rail eliminates joint maintenance

Not long ago train time on Mason Street was announced by the clickety-click, clickety-clack of car wheels passing over track joints. The noise and vibration annoyed the residents. And the railroad was not happy either—the cost of repairing worn joint bars and replacing battered rail in a paved street is high.

Recently, oxy-acetylene pressure-welded rail was installed on Mason Street under Oxweld procedures. Pressure-welded rail is continuous rail—standard lengths of rail are welded together at their ends in the oxy-acetylene flame to form a single rail as much as 7,000 feet long. Because there are no joints, noise and vibration is greatly reduced. On Mason Street, in tunnels, in open track, pressure-welded rail requires no joint maintenance, does not batter, needs no joint bars.

Oxweld procedures for pressure-welding rail have been developed as a result of working with American railroads for more than a third of a century. Ask your Oxweld representative for more information.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York
In Canada:
Canadian Railroad Service Company, Limited, Toronto

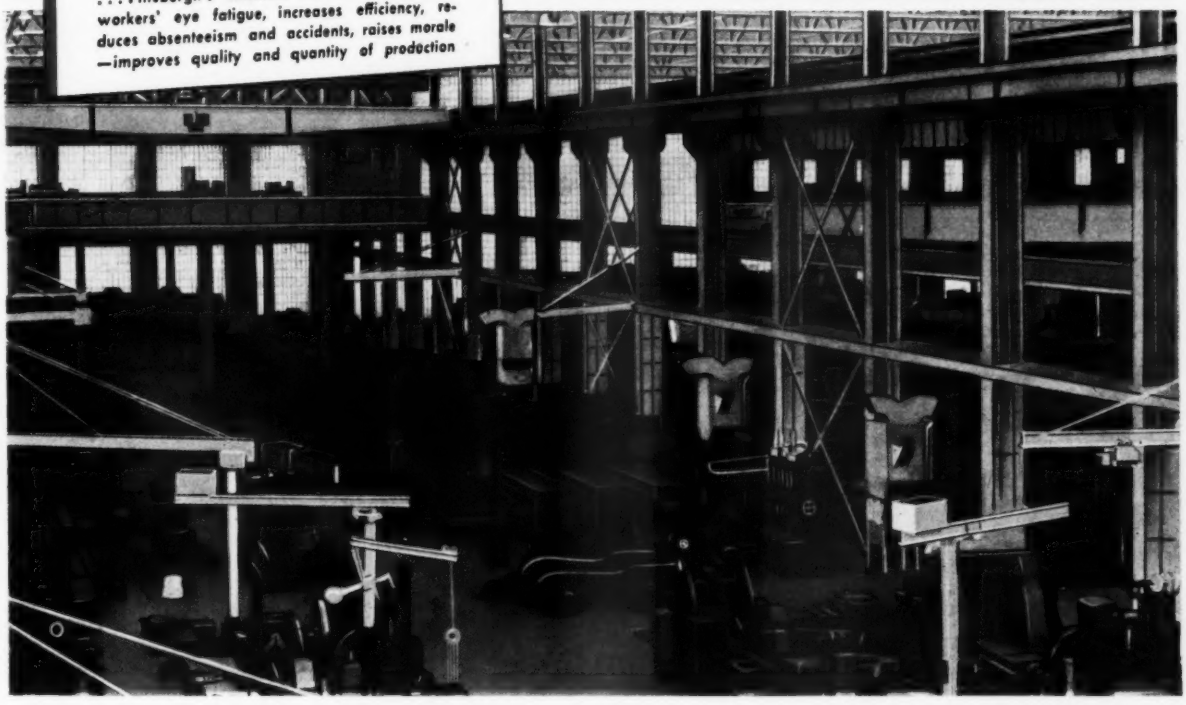
SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

Color Dynamics

... Pittsburgh's scientific use of color lessens workers' eye fatigue, increases efficiency, reduces absenteeism and accidents, raises morale —improves quality and quantity of production

CHESAPEAKE & OHIO

Makes Use of Color Dynamics in Postwar Improvement Program!



Pittsburgh's *Color Dynamics* Painting System—adopted throughout vast Huntington shops—aids workers to rebuild and modernize rolling stock of one of the country's leading railway lines speedily and efficiently

MASTER MECHANICS and shop executives are finding by actual experience that Pittsburgh's COLOR DYNAMICS provides improved working conditions so that the important task of rebuilding and modernizing rolling stock can be performed with greater speed and skill.

COLOR DYNAMICS is based upon the fact that human beings are influenced by the energy in color. A notable example is the huge Huntington, W. Virginia, shops of the Chesapeake & Ohio Railway. Here color has been "engineered" on a vast scale for machines, walls, floors and ceilings.

By the use of proper focal and eye-rest colors, operating parts of machines are separated from stationary parts and the materials being fabricated. The worker sees his job better. Eye fatigue, so often the cause of lower efficiency, is lessened.

In place of drab, light-absorbing walls, morale-building colors improve the employees' mental attitude. Use of colors which warn of impending danger further reduces accident hazards.

Labor and management benefit alike by such purposeful use of color. Continuity of employment is increased. Quantity and quality of production are kept at high levels.

You can test COLOR DYNAMICS in your shops—simply and easily. Try it on a machine or two. Then compare results! Write for a free copy of our book which completely explains COLOR DYNAMICS.

There's A High-Quality Pittsburgh Finish For Every Railway Need!

Pittsburgh also offers a complete line of tough, long-lasting and quick-drying railway finishes—not just as good but better than prewar quality.

CARHIDE—attractive new colors for freight cars.

STATIONHIDE—For stations and warehouses.

IRONHIDE—for bridges and signal towers.

LAVAX SYNTHETIC ENAMEL—for passenger cars and locomotives.

PITTSBURGH PLATE GLASS COMPANY Industrial Paint Division, Pittsburgh 22, Pa. Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pennsylvania; Houston, Texas; Los Angeles, California; Portland, Oregon. Ditzler Color Division, Detroit, Michigan. The Thresher Paint & Varnish Company, Dayton, Ohio.

PITTSBURGH PAINTS

PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH, PA.

RAILWAY FINISHES

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

(*Continued from page 322*)

district manager, at Chicago, has been promoted to district manager, with the same headquarters, succeeding **Walter E. Hadley,** who has retired. **Bennett S. Chapple, Jr.,** assistant to the sales vice-president of U. S. Steel of Delaware, has been appointed assistant sales vice-president, with headquarters at Pittsburgh.

Lyle I. Martin, chief engineer of the **Morden Frog and Crossing Works,** Chicago, has been appointed vice-president in charge of engineering, with the same headquarters. Mr. Martin was born at Plano, Ill., on December 7, 1890, and received his higher technical training at Lewis Institute, Chicago. He has been

Lyle I. Martin

chief engineer of Morden since January, 1939. Previously he served as chief draftsman and sales engineer of the Morden Frog and Crossing Works, and, for two years, as civil engineer in the office of the chief engineer of the Chicago & North Western. He is a member of the American Railway Engineering Association, the Maintenance of Way Club of Chicago, and the Western Railway Club.

Albert P. Boysen, whose appointment as western division engineer of the **American Bridge Company** (a subsidiary of the

Albert P. Boysen

United States Steel Corporation), with headquarters at Chicago, was reported in the January issue, was educated at the Chicago Technical College and at Armour

(*Continued on page 328*)

Weed & Grass Control ... PLUS Permanent Improvement of Road Bed

BYSULOX C

Toxic Oil Weed Killer & Soil Sterilizing Agent

GENERAL CHEMICAL RESEARCH makes another significant contribution to the science of chemical weed killing with Bysulox C—*the fortified toxic oil weed killer.*

Here is a truly advanced, highly penetrating oil blend which gives quick kill of weeds and noxious grasses with more permanent results than have ever been obtained with any other spray material.

Used alone or in combination with Bysulox A, Bysulox C materially increases soil sterilization and suppression of re-growth. Its blend of toxic oils is more waterproof, with longer-lasting efficiency. Bysulox C is not subject to quick decomposition or neutralization as are the commonly used, unstable water soluble salts.

Bysulox C creates a condition of ballast and soil which is intolerant to the support of weeds and grasses or to successful germination of seeds. According to the quantities used, applications may be planned to produce this sterilizing condition gradually or quickly, as desired.

With such advantages, Bysulox is the answer to your 1947 weed and grass control problem.

For information on Bysulox treatment as applied to your particular needs, consult

See our exhibit at Booth 31

National Railway Appliances Association Exhibition, Coliseum, Chicago, March 17-20.

BYSULOX KILLS GRASS

GENERAL CHEMICAL COMPANY

Weed Killer Division

40 Rector Street, New York 6, N. Y.

(*Continued from page 326*)

Institute of Technology. He entered the service of the American Bridge Company as a shop clerk and later became a draftsman. Since 1942 he has been in charge of design for important building activities in the western district, including the design of the structural steel for the corporation's newest subsidiary, the Geneva Steel Company plant, at Geneva, Utah.

Dr. Goodrich is a graduate in civil engineering of Dartmouth College and holds the honorary degree of doctor of engineering from the same college. He entered the service of the company in 1906 as a draftsman. As chief engineer of the company he was in charge of designing and engineering of the Carquinez Straits bridge and the San Francisco-Oakland Bay bridge.

Trade Publications

(*To obtain copies of any of the publications mentioned in these columns, use postcards, page* 221)

Sanding Equipment for Diesel Locomotives—The Ross & White Co., has just issued its Bulletin No. 63—an 8-page illustrated pamphlet dealing with the company's equipment for supplying sand to Diesel locomotives. The text is supported with diagrams and photographs of recent installations, and illustrations of such items as sand valves, sand dryers and elevating drums.

Maintenance Wall Chart—A new "preventive maintenance" wall chart has been issued by R. G. LeTourneau, Inc., as a quick guide to servicing and lubricating the company's Super C Turnapull. The chart indicates when and where the machine should be checked, adjusted and lubricated. Lubrication points are illustrated by 32 labeled photographs, and the chart includes recommendations on the use of lubricants. Designed to hang on the wall of field office or shop, the chart measures 17 in. by 22 in.

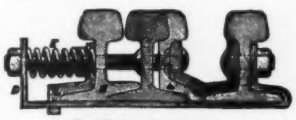
Stonhard Maintenance Products—The Stonhard Company has published a 16-page booklet entitled "Railroad Bridge and Building Maintenance Handbook." Separate sections are devoted to each of the major Stonhard products, and each section is well illustrated with photo-

(*Continued on page* 330)

FRED. C. WEIR'S

Improved Steel Rail Frogs.

Spring Rail Frog.



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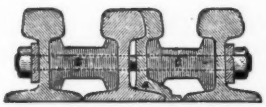

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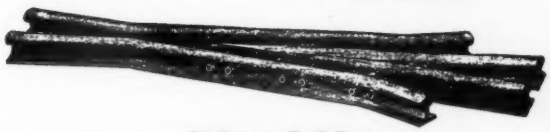


Stationary Rail Frog.

The above cuts represent plans and cross sections of my improved steel rail frogs, and for the better understanding of them, attention is called to the following description, reference being made to the letters on the cuts themselves:

A shows my method of joining the short point rail to the main point rail, by which I avoid entirely the cutting of the latter, thus preserving its full strength and ***which is not done by manufacturers who notch the short point rail into the main point by cutting away either the head or flange or both as it is the common custom.***

B shows the construction of the spring or movable wing rail of my spring rail frog, by which plan of setting the inside flange of the wing rail up, and on top of the flange of the main point rail ***I avoid entirely the cutting away of the inside flange as has always heretofore been the practice, thereby saving the full strength of the rail*** as well as ensuring the point and wing rail being on an even surface when the wheels are passing over them.

C, strap for holding down spring rail and thereby taking the undue strain off from the spring bolt.

D, strap and sliding plate combined.

E, spring.

F, flexible joint by the use of which ***I am enabled to make spring rail frogs of the same length as the ordinary fixed rail frogs, thus saving a large amount of usually wasted material and which is not practicable without the use of this joint.***

G, showing one plan of construction with cast iron spacing blocks.

H, showing my manner of construction with U shaped or channel iron spacing pieces. ***The exclusive right to manufacture frogs constructed in this manner, is secured to me broadly by letters patent of the United States.***

I claim for the above improvements, the following advantages:

The strongest and most durable construction of main and short points and ***which is the vital part of any frog.***

The only spring frog constructed by which the full strength of the spring rail is preserved.

The only spring frog constructed that can be used of the same length and to be put in place of the ordinary fixed or stationary rail frogs for Standard and Narrow Gauge Railroads.

Prices furnished on application. Address,

FRED. C. WEIR,

December 1879 GRAND HOTEL, CINCINNATI, OHIO.

From this modest beginning, over 65 years ago, this company has developed into one of the major producers of special track work for the nation's leading railroads.

WEIR KILBY CORPORATION

CINCINNATI 12, OHIO Successors to **BIRMINGHAM 7, ALA.**

WEIR FROG CO. . . . KILBY FROG & SWITCH CO. . . . CINCINNATI FROG & SWITCH CO.

(*Continued from page 328*)

graphs of typical installations. The descriptions and recommendations are brief and clear, and cover the application of Stonhard products to a wide range of railroad structures.

Asphalt-Cement Pressure Grouting—The Texas Company has published a 16-page bulletin on the causes of unstable roadbed, the common methods of treatment, and stabilization by means of asphalt-cement pressure grouting. The bulletin, which is well illustrated with photographs, tables and diagrams, contains a section outlining the materials required and the procedure suggested for setting up a grouting operation.

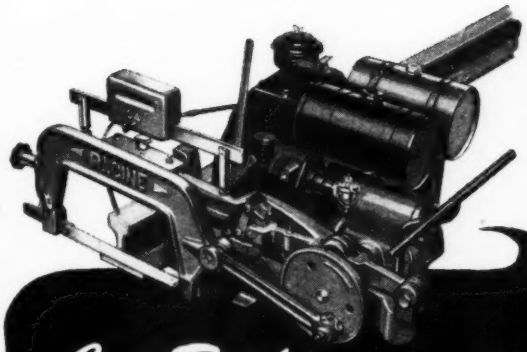
Manganese Steel—The American Manganese Steel Division of the American Brake Shoe Company has issued a 40-page bulletin, No. 943-R, entitled "Manganese Steel 'The Toughest Steel Known' for the Railroad Industry." It contains information about austenitic manganese steel, and the production facilities and research activities of the company. Applications of manganese steel to railroad service are illustrated and described in conveniently-arranged sections. In addition, there are sections devoted to Amsco welding materials for reclamation and hard-surfacing, and to Amsco-Nagle pumps for abrasive-laden materials.

Snow Plows—The Gravely Motor Plow & Cultivator Co., has published an eight-page bulletin describing the company's power-driven snow plows, of which two models are available—the reversible blade model and the V-type. Numerous illustrations show the construction and application of these machines, which are designed to use various attachments, such as power brushes, rotary plows and sprayers.

Rust-Oleum Film—The Rust-Oleum Corporation has recently issued a new sound film on "The Battle Against Rust" for the use of sales organizations. The film's 12-min. running time opens with a section on the damage caused by rust and its cost. Subsequent sections are devoted to the application and coverage of Rust-Oleum products. After taking the audience on a tour through the company's plant, the final section deals with the uses of Rust-Oleum for the protection of such items as fences, trucks, trailers, bridges, and railroad equipment.

Color Dynamics—The Pittsburgh Plate Glass Company has just issued a 32-page booklet dealing with the use of color as an aid to the efficient operation of plants and factories. Separate sections describe the application of color to machines, walls, ceilings, floors, aisles, and mobile equipment, and the text of each section is supported by full-color illustrations.

Prefabricators Directory—The Timber Engineering Company has published a directory which gives the names and addresses of firms in the prefabricating lumber industry and shows the types of structures fabricated by each concern. The directory indicates which firms have facilities for the treatment of fabricated lumber with preservatives or fire retardants.



Cut Rail . . .

RIGHT ON THE TRACK

with . . .

RACINE PORTABLE Rail Saws

Your track maintenance and repairs can be speeded up with Racine Portable Rail Cutting Machines. This equipment cuts rail ends right on the track. No extra handling or hauling of the rail to central cropping plant.

Only one man needed to operate the Racine Rail Saw. Two men can easily carry it from rail to rail. These fast, accurate machines produce smooth, clean cuts without the overheating of rail ends that so often starts fractures leading to rail failure. Model 15 for rails to 7⅜" high; Model 16 for rails to 10" high.

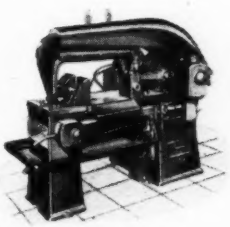
SIX COMMON JOBS FOR THIS MACHINE

1. Cutting and fitting rails at interlocking plants, crossings and switches.
2. Closing track in rail-laying operations.
3. Smooth, accurately cut rail for insulated joints.
4. Proper staggering of joints in curves.
5. Removing split, worn and battered rail ends.
6. Cutting out sections of wheel burned rails and fissures.

Models are available with gas engines, compressed air or electric motors. Write for complete catalog No. 58A. Address RACINE TOOL AND MACHINE CO., 1738 State St., Racine, Wisconsin.

RACINE HEAVY DUTY METAL SAWS FOR RAILROAD SHOPS

Cut axle shafts, boiler pipe, channels, angles and beams quickly and accurately. Models are available in all price ranges for either high speed production metal cutting or general all around shop work. Capacities 6" x 6" to 20" x 20". Ask for general catalog No. 12 giving description of complete Racine Saw line.



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RACINE
RACINE TOOL and MACHINE CO.

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UNSURPASSED FOR PUMPING FAST

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The new distributor plans an active sales and service program in the railroad industry under the leadership of

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WINS IN THE STATE OF NEW YORK

Cities, processing plants and manufacturing firms throughout the state of New York now own more than three hundred and twenty-five Layne high efficiency Well Water Systems. These individually designed, quality built and correctly installed water systems are now producing millions of gallons of water daily at an amazingly low cost.

Into all Layne Well Water Systems only the very finest quality materials have gone, thus providing the absolute maximum in long life with a minimum of upkeep cost.

Layne Well Water Systems and Vertical Turbine Pumps possess many distinctive and definitely superior features that have been developed and thoroughly proven by Layne. Engineers the world over readily recognize Layne Well Water Sytems as being the best that money can buy.

For further information, catalogs, bulletins, etc., address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

PUMPS For

Wells—Lakes—Rivers—Reservoirs—Irrigation Projects—are obtainable in sizes from 40 to 16,000 gallons per minute, powered by electric motor, V-Belt or angle gear drives. Write for Pump Catalog.

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WELL WATER SYSTEMS

VERTICAL TURBINE PUMPS

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. • Layne-Atlantic Co., Norfolk, Va. • Layne-Central Co., Memphis, Tenn. • Layne-Northern Co., Mishawaka, Ind. • Layne-Louisiana Co., Lake Charles, La. • Louisiana Well Co., Monroe, La. • Layne-New York Co., New York City • Layne-Northwest Co., Milwaukee, Wis. • Layne-Ohio Co., Columbus, Ohio • Layne-Pacific, Inc., Seattle, Washington • Layne-Texas Co., Houston, Texas • Layne-Western Co., Kansas City, Mo. • Layne-Western Co. of Minnesota, Minneapolis, Minnesota • International Water Supply Ltd., London, Ontario, Canada • Layne-Hispano Americana, S. A., Mexico, D. F.

REDUCE...

Track Maintenance Time and Cost

with a Mall REG. U.S. PAT. OFF.

PORTABLE RAIL GRINDER

- ★ *Off-The-Track*
- ★ *Easily Portable*
- ★ *Efficient*
- ★ *Safe*
- ★ *Economical*

You can reduce wear and tear on rolling stock, reduce road bed maintenance and increase rail life with this powerful, light weight, off-the-track 6 H.P. Mall Rail Grinder. The variable speed gasoline engine provides abundant power for smoothing off rail joint welds, grinding frogs, switch points and crossings.

Attachments, quickly interchangeable with grinding wheels, can be furnished for drilling rails, ties and crossing planks, drilling holes for lag screws, wire brushing and other jobs. The patented slip lock detail on ends of heavy duty flexible shafting and on various attachments speeds up tool changing. Ruggedly constructed to stand up under hard continuous use. Pneumatic wheel makes for easy rolling. This unit will quickly repay its original cost in lower maintenance and grinding costs.

Complete Catalog Upon Request.

Railroad Department

MALL TOOL COMPANY

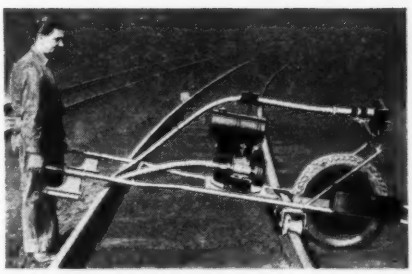
7746 South Chicago Ave. Chicago 19, Illinois

See Our Advertisement in The Saturday Evening Post—April 5 Issue.

MALL REPRESENTATIVES: D. L. O'Brien, St. Paul; Earl E. Thulin Co., Chicago; Allied Tool & Supply Co., Louisville; G. A. Secar, St. Louis; John N. Thorp Co., New York.

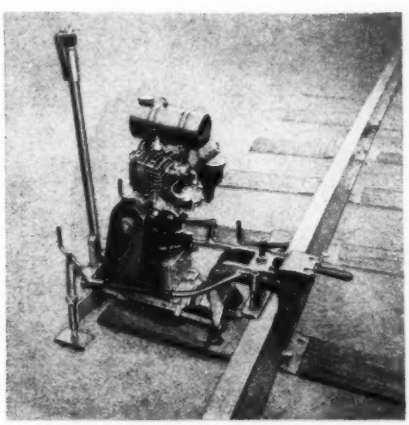
Mall REG. U.S. PAT. OFF. **PORTABLE POWER TOOLS**

EASIER, FASTER TRACK WORK with these NEW RTW MODELS



Portable Flexible-shaft Grinder, Model P-40

You'll like this new easier-to-handle grinder for both on- and off-track work. Transporting wheel adjusts to three positions by new, foolproof spring locking device—machine clears switches and crossovers with ease, levels quickly for off-track use, gets on and off track faster. Power-unit mounted on ball bearing turn table facilitates handling flexible shaft and attachments. Six hp. air-cooled gasoline engine or electric motor drive.



Power Track Drill, Model P-34-A

Superb balance, light weight . . . features you'll appreciate in this new track drill. Attached and removed from rail *fast*. Quick, accurate adjustment for leveling with rail and uneven ground; adjusts to various rail sizes. Lateral feeding of drill by ratchet gear and rack simplifies operation. Holes up to 1½" in less than a minute. Motor raises or lowers on frame. V-belts well guarded.

Get full details on these better, lighter, easier-to-work-with track machines. Bulletins on request.

Railway Track-work Co.

3207 KENSINGTON AVE., PHILADELPHIA 34, PA.

2080

NOW at your SKILTOOL DISTRIBUTOR'S

PNEUMATIC SKILTOOLS!

You can get these advanced *Pneumatic* SKILTOOLS from the same distributor who supplies you with Electric SKILTOOLS. Like the Electric SKILTOOLS, *Pneumatic* SKILTOOLS are expertly designed on tested engineering principles, and made from the finest materials available. The line includes Riveting Hammers, Drills, Die Grinders, Screwdrivers and Nut Runners. See your distributor about a demonstration!

SKILSAW, INC.
5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities

ELECTRIC PNEUMATIC
SKILTOOLS

MADE BY SKILSAW, INC.

always ready—

- to tackle springtime maintenance work, on a few hours notice—reshaping ballast, clearing ditches, reestablishing good drainage.
- and to whip unexpected late snows from classification yards, buck the drifted cuts, keep the traffic moving.

This year-round worker does the job of an army of men—better!

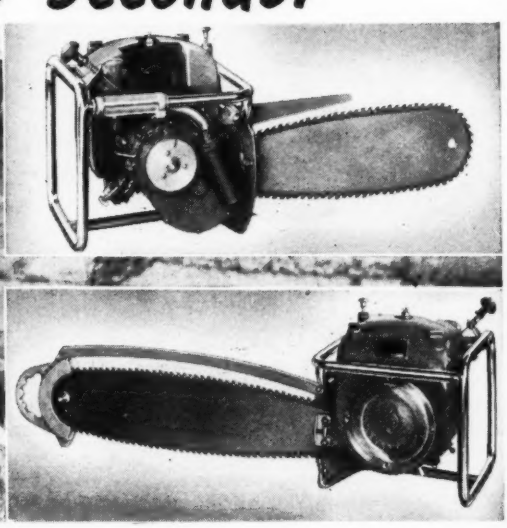
Write for the Jordan Book—100 action pictures.

O. F. JORDAN COMPANY

WALTER J. RILEY, *President*

EAST CHICAGO, INDIANA

30 INCHES . . . . 30 Seconds!



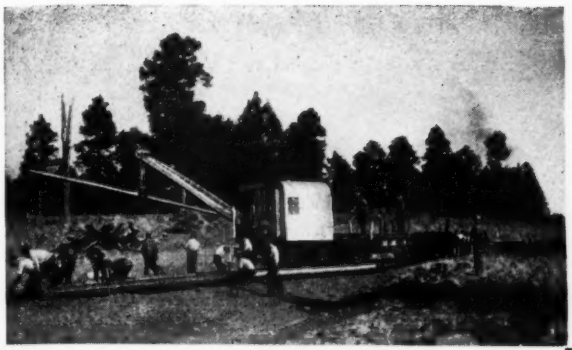
Bucking a 30" pine log in 30 seconds is common practice for the Reed-Prentice Timberhog 4 H.P. gasoline powered chain saw. Hard woods are handled at a comparable rate of speed.

This light weight, easily portable Timberhog saw in 20" (one man model) 24" and 30" (two man models) is ideally suited for right of way clearance and innumerable other purposes in the railway and heavy construction industries. Write for the name of your nearest distributor.

ABOVE: One Man Timberhog Saw — 20" capacity.
BELOW: Two Man Timberhog — 24" and 30" capacity.

REED-PRENTICE CORP.
"TIMBERHOG" SAWS
WORCESTER MASS., U.S.A.

Address all inquiries to Dept. R, TIMBERHOG SAW DIVISION



ANY JOB— ANYWHERE

With bucket, hook, magnet, dragline or rail tongs, the Burro is ready to handle any job—anywhere. Burro's fast travel speeds permit it to get out on the job without delay—in addition, heavy draw bar pull permits Burro to haul its own work gang or cars of equipment, often eliminating need for a work train or locomotive. Designed for railroad work—and built to stand the punishment of hard, year after year use on any job, anywhere they are needed, Burro cranes are the busiest machines on the railroad. Only Burros have all these features:

- **Fast Travel speeds**—Draw Bar Pull up to 7500 lbs.
- **Elevated Boom Heels**—for working over high sided gondolas
- **Low overall height**—Burro can be moved and worked on a standard 46 foot flat car
- **Short Tail Swing**—increases crane operation—will not foul adjoining track
- **Wide operating range**—can be used with clamshell bucket, rail tongs, hook, magnet or dragline

Write For Descriptive Catalogs

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1301 S. Kilbourn Ave. Chicago 23, Ill.

WARWOOD WORKMANSHIP MAKES THE DIFFERENCE

WARWOOD TRACK TOOLS

Spike Maul

No. 3-T

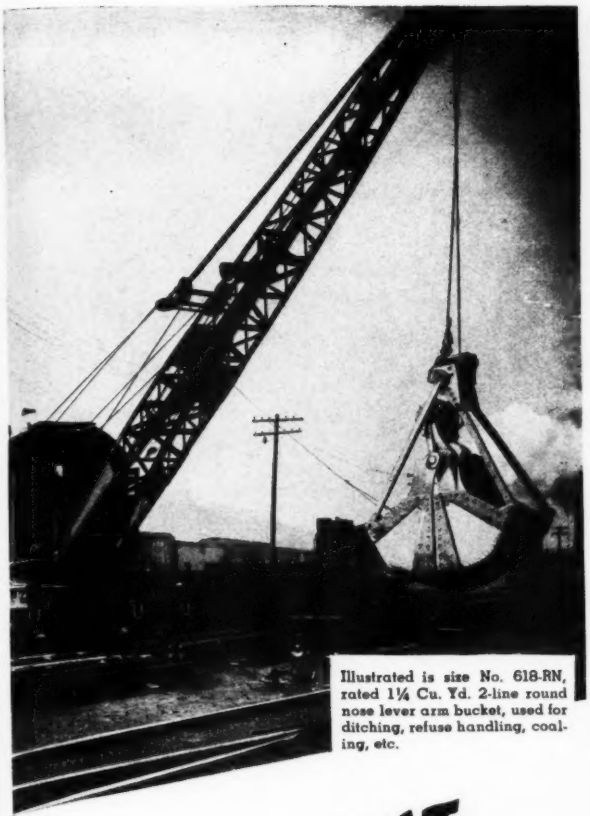
For track construction and general maintenance of way work the Warwood Spike Maul is correctly designed. Accurately forged and scientifically heat treated to meet AREA specifications and to withstand severe service. Press forged to develop fine granular structure of steel and to prevent crystallization, Warwood is the name to remember when buying Spike Mauls. Made in both Warwood Standard and Warwood Alloy grades.

PICKS... MAULS... WRENCHES
BARS... TONGS... SLEDGES
ADZES... PUNCHES... CHISELS

WARWOOD SINCE 1854 FORGED TOOLS

WARWOOD TOOL COMPANY

WHEELING, WEST VIRGINIA



Illustrated is size No. 618-RN, rated 1¼ Cu. Yd. 2-line round nose lever arm bucket, used for ditching, refuse handling, coaling, etc.

PICK IT OUT YOURSELF!

For the railroads Blaw-Knox builds buckets to handle everything from ashes to ore . . . And from more than 100 types and sizes you can select one which exactly meets your specifications. For a quick appraisal of Blaw-Knox Buckets widely used for railroad work write for Bulletin 1989.

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2054 Farmers Bank Bldg., Pittsburgh 22, Pa.

BLAW-KNOX
Clamshell **BUCKETS**

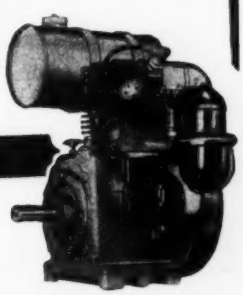
WHEN YOU SPECIFY

WISCONSIN HEAVY-DUTY

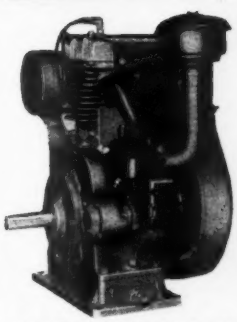
Air-Cooled Engines

Productive Capacity is the ever important factor in the selection of suitable power units for motorized equipment. This, together with heavy-duty serviceability are two big reasons why more and more railway maintenance equipment within a 2 to 30 HP range is being powered by Wisconsin Air-Cooled Engines.

Day in and day out, Wisconsin Engines deliver hard hitting, dependable performance on the really tough jobs. Because of their complete freedom from cooling chores and the impulse coupling magneto, which means an always quick start, WISCONSIN are the Engines to specify for more power, fewer breakdowns and lower maintenance cost on your motorized equipment.



Models AB and AK 4-cycle, single cyl. engine, 2 to 4 hp.



Models AEH, AFH, AGH, AHH 4-cycle, single cyl. standard engine, 3 to 9 hp.

Model VE-4, V-type, 4-cyl. standard engine, 20 hp.

Most H.P. per pound

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Corporation
MILWAUKEE 14 WISCONSIN U S A
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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Patent 2,196,427 for
Self-Acting Brake

for railway trailers and push cars, outright or royalty. Approved by management of one road; in use since 1939; doubles push car safety and service life; easily and inexpensively installed on standard cars.

Address O. G. Prince, Section Foreman, Central of Georgia R.R., Godfrey, Ga.

Model No. 1955

Fastens 4 Ways
Satisfies ALL Ways

IT'S JUSTRITE

That's the opinion of railroad men about this new Justrite Oilers and Greasers Lantern No. 1955. Headpiece can be fastened in four different positions—on head, shoulder, wrist or around leg. Battery case fastens with shoulder straps—hands are left free for maintenance work. Plain lens for "spot" beam. Available also with famous Justrite Honeycomb Lens for larger spread of light. Use standard 6-volt railroad battery and bulb. Durably constructed—tops for all maintenance work!

Ask your supplier or write for details.

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We can help you with our new

CONTRACT MAINTENANCE SERVICE

Our completely mechanized, competent crews are organized to do your track work on a per job or annual maintenance basis.

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Renewing bad rails
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Our service includes advance inspection of your property by our experienced railroad engineer, to insure complete co-ordination as work progresses. We invite your inquiries.

Quality at the Right Price

TRACK MAINTENANCE SPECIALISTS

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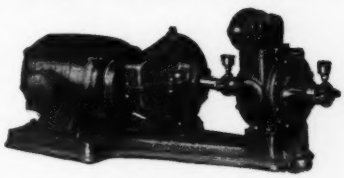
SELF-ADJUSTING FOR WEAR

"Bucket Design" swinging vanes automatically compensate for wear. When the "buckets" finally wear out, a 20-minute replacement job restores the pump to normal capacity.



Write for Bulletin No. 307—Facts About Rotary Pumps

BLACKMER PUMP COMPANY
2140 Century Avenue Grand Rapids 3, Michigan
REFUELING UNITS FOR DIESEL LOCOMOTIVES

POWER PUMPS - HAND PUMPS · EZY-KLEEN STRAINERS ·

Announcing the new

HEAVY DUTY ELECTRIC MOTOR
with Slip Clutch between Motor and Drill

to operate our Patented K-M Drill the easy way.

These heavy duty motors have added power, are built stronger, yet are easy to move and handle in out-of-the-way places.

A MANY-PURPOSE TOOL

Designed for fast, easy work in mud, clay, or sand. Drills holes from 3" to 16" in diameter in quick time, saving 50% to 75% on digging costs, and simplifying work.

Used for drilling under roadbeds or streets, for piling, telegraph or telephone poles or fences, signaling installations, sump holes for pumps, grouting, repair and construction work of all kinds.

Our Patented K-M Drills are operated by air or electric motors.

DRILLS AT ANY ANGLE

Let us tell you about this equipment and our advances.

KA-MO TOOLS, Inc.
2121 S. Troy St., Chicago 23

ALPHABETICAL INDEX TO ADVERTISERS, MARCH, 1947

Whether it be the largest single piece ever hauled by a railroad or the millions of tons made up of small pieces, they all go rolling along, mile after mile.

Meanwhile, Improved Hipowers are absorbing the shocks and pressures of these heavy rolling loads, protecting rail ends and joint bars. Yes—

IMPROVED HIPOWERS
IMPROVE TRACK

THE NATIONAL LOCK WASHER COMPANY, NEWARK, 5, N. J., U. S. A.

A COMPLETE LINE OF RAILWAY SPRING WASHERS

Compression Rail Anchors

THE RAILS COMPANY

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